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IN THE

Supreme Court of the United States

OCTOBER TERM, A. D. 1956.

No. 1007

BLOCK DRUG CO., AMM-I-DENT, INC., AND F. W. WOOLWORTH CO.,
Petitioners,

vs.

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Respondent.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

BENJAMIN B. SCHNEIDER,
1825 Prudential Plaza,
Chicago 1, Illinois,
Attorney for Petitioners.

R. HOWARD GOLDSMITH,
WILLIAM R. LIBERMAN,
Of Counsel.

THE GUNTHORP-WARREN PRINTING COMPANY, CHICAGO

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CASE CITED.

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STATUTE CITED.

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Petitioners pray that a writ of certiorari issue to review the judgment of the United States Court of Appeals for the Seventh Circuit, affirming the decision of the District Court holding valid and infringed the claims of two patents relating to ammoniated dentifrices.

OPINIONS BELOW.

The opinion of the District Court is reported at 133 F. Supp. 580, 107 USPQ 159, and is printed as Appendix C hereto. The opinion of the Court of Appeals is reported at 241 F. 2d 6, 112 USPQ 204, and is printed as Appendix B hereto.

JURISDICTION.

The judgment of the Court of Appeals is dated January 16, 1957 and was entered on that date. A petition for rehearing was denied February 18, 1957. Jurisdiction of this Court is invoked under 28 U. S. C. § 1254.

QUESTIONS PRESENTED.

1. Is the rule of invention laid down by this Court in *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 1950, 340 U. S. 147, 95 L. ed. 162, applicable to chemical patent cases as well as mechanical patent cases?

2. Can a narrow claim based on a disclosure in a later filed application "relate back" to the date of an earlier filed application which did not have a disclosure sufficient to support such a narrow claim, merely because the early application contained a broad, unpatentable claim, when there was an intervening public use of the subject matter patented in the subsequent narrow claim?

3. When the prior art shows that chemical A and chemical B have each been recommended for use in dentifrices, (a) can invention be present in determining by routine experiment that 2% is the minimum amount of A that should be used for efficient results, or (b) can infringement exist when certain proportions of A and B are taught to be necessary when used together to obtain a desired result which is the basis for asserting invention, and the alleged infringement uses radically different proportions?

STATEMENT.

This case presents in sharp focus the confusion in the lower courts as to the applicability of the *A & P* rule to chemical patent cases. It also raises, for the first time before this Court, the question whether a doctrine of "re-

lation back" exists in the patent field whereby a patent is credited with priority as of the date of filing of an application containing a broad, unpatentable claim, never granted, although the more limited patented claims were first presented with a supporting disclosure in another application filed many years later.

In order to understand how these questions arise, a brief review of the facts is necessary.

Plaintiff brought suit against defendants for infringement of two patents in the marketing of ammoniated tooth paste and tooth powder. Defendants challenged the validity of the two patents and denied infringement of one. The lower courts declared both patents valid and infringed.

The two patents are described as follows.

The Kesel and Wach Patents.

The Kesel patent relates to the use of a single active ingredient in a dentifrice to aid in the prevention of tooth decay (often called dental caries). This ingredient is dibasic ammonium phosphate, frequently called simply "dibasic."

Dibasic is one of several chemicals known generically as "alkaline," "basic" or "non-acid" ammonium salts. Of these materials, Kesel prefers to use dibasic because of its taste, but he clearly states that "all basic ammonium salts are effective." Indeed, one of them, ammonium carbonate, is said by Kesel to be the most effective for his purposes.

Kesel does not claim broadly the use of dibasic, but claims only its use in specific proportions. Each claim refers to a dentifrice containing dibasic in an amount not substantially less than 2% of the composition.*

The Wach patent uses two active chemicals in a dentifrice to aid in the prevention of tooth decay. One chemical

* Typical claims of both the Kesel and Wach patents are quoted by the Court of Appeals, Appendix B, pp. 31 and 32.

is a basic ammonium salt such as the dibasic of Kesel. The other chemical is urea, sometimes referred to as "carbamide." Urea is also an ammonium compound. It is slowly broken down in the mouth to form a basic ammonium salt, ammonium carbonate.

Wach's claims all describe a dentifrice containing both a basic ammonium salt and urea in amounts of at least 1% by weight of each chemical. Some of Wach's claims refer broadly to basic (non-acid) ammonium salts, others are specific to the dibasic preferred by Kesel.

The Teachings of the Prior Art.

Neither basic ammonium salts nor urea were original with or discovered by Kesel or Wach for use in dentifrices to aid in the prevention of tooth decay.

It is uncontroverted that the prior art taught the use of each of these ingredients in dentifrices. Indeed, the first suggested use of such chemicals was some thirteen years prior to the filing of the first Kesel and Wach application in 1947.

It was Grove and Grove in 1934 who discovered the value of basic ammonium salts in tooth cleaning preparations and it was Stephan in 1940 who first worked with and taught the effectiveness of urea. In early articles, Kesel, Wach and their co-workers pay tribute to the work of Grove and Grove and of Stephan.

A paper by Kesel *et al.*, states as to the work of Grove and Grove:

> "• • • They noted that the acid salts of ammonia were not effective in dissolving mucin plaques [tartar] and concluded that the alkaline reserve of the saliva influenced the action of salivary ammonia, smaller volumes of ammonia being more effective in an alkaline saliva than larger volumes of ammonia in salivas that

were acid in reaction. *This observation coincides with ours in that the alkaline salts of ammonia were effective in inhibiting the growth of lactobacilli*• whereas the acid salts were not. • • •'' (Emphasis supplied.) (American Journal of Orthodontics and Oral Surgery for February 1947, R. II 958.)

Wach *et al.*, referred to the Grove and Grove and Stephan articles, saying:

> ''Grove and Grove, in 1934, stated that dental caries is retarded when salivary ammonia is high, and that plaque formation is retarded by the local use of a solution containing ammonia. Stephan, in 1940, suggested the use of urea in a mouth rinse to control dental caries.'' (Journal of American Dental Association, January 1942, pages 61-66, Doc. App. 153.)

In 1943, two of Kesel's co-workers acknowledged that the prior art taught that urea acted latently or slowly because of its gradual breakdown into a basic ammonium salt (ammonium carbonate). They said:

> ''The use of carbamide (synthetic urea) in a mouth rinse has been suggested because in the mouth the carbamide is converted into ammonium carbonate which acts as an efficient buffer for acids.'' (Journal of Dental Research, Vol. 22, pages 103-106, Doc. App. 159.)

In 1945 Dr. Kesel and his associates pointed out with reference to Grove and Grove that ''the significance of their observations has not been grasped'' and went on to say:

> ''The above authors as well as Stephan have reported lowering caries incidence in many cases by using ammonia and urea mouth rinses.'' (Science, 1945, Doc. App. 165.)

• Lactobacilli are the bacteria which are asserted to be largely responsible for tooth decay.

These statements of the patentees and their co-workers well summarize the state of the prior art prior to the filing of the first application for patent in suit in 1947.

Since both chemicals involved in the Kesel and Wach patents were known to be old in dentifrices, what, then, was the basis upon which Kesel and Wach were granted patents? Kesel contended that he had discovered a minimum amount (2%) of a particular basic ammonium salt which was effective. Wach contended that there was something inventive or "synergistic" in a mixture of a basic ammonium salt and urea in the specific ratios in which he mixed the two chemicals.

A brief history of the Kesel and Wach applications will help to clarify these contentions.

A Brief History of the Kesel and Wach Patents.

The Kesel and Wach patents grew out of an application originally filed in 1947 in the names of Kesel, Wach and others. This application broadly described and claimed dentifrices containing (1) basic ammonium salts alone and (2) basic ammonium salts together with urea.

In 1948, it was decided that these were independent concepts, the first by Kesel, and the second a subsequent concept by Wach. Accordingly, the parent application was abandoned in favor of (1) a continuation-in-part application filed in the name of Kesel for basic ammonium salts alone and (2) a continuation-in-part application filed in the name of Wach for basic ammonium salts used together with urea.

(A) Kesel.

Neither the parent 1947 application nor the 1948 continuation-in-part application of Kesel provided a basis for patentability to Kesel of any claims subsequently found patentable. However, each of these applications contained an extremely broad claim which read:

> "A dentifrice comprising as an essential ingredient dibasic ammonium phosphate."

The prior art prevented Kesel from obtaining this broad claim. He then attempted to narrow his claims to obtain claims which were limited to at least 1% of the chemical, but even such limited claims were found unpatentable by both the Examiner and the Board of Appeals. The Board of Appeals held that there was nothing in the application to show anything critical in 1% of the chemical or indeed, in any other proportion. The application became abandoned when Kesel dismissed by stipulation an action brought against the Commissioner to overturn the decision of the Board. Kesel thus acquiesced in the Patent Office holding of the unpatentability of his broad claims.

Kesel's patent ultimately issued on a second continuation-in-part application filed in 1952. Over half of the specification which ultimately resulted in Kesel's patent was new in the 1952 second continuation-in-part. This added matter is printed in red in a copy of the patent which is attached hereto as Appendix A.*

The experimental work behind the greatly augmented disclosure of the 1952 application was not even performed until February of 1952. Thus, this new matter was not within Kesel's knowledge until more than five years after defendants' dentifrices were placed on the market in 1946.

* Of course, the claims were also new in this application. The claims are printed in black, however, to clearly show the new matter added to the disclosure.

The Kesel patent was issued because the new matter first known and first added in 1952 allegedly provided a basis for criticality in a minimum of 2% dibasic. The patentability of the claims ultimately granted Kesel is based squarely on this alleged critical minimum. This is made clear by a letter from Kesel's attorney to the Patent Office, filed shortly after the second continuation-in-part was filed. The letter states (Doc. App. 74):

> "At the recent interview it was pointed out that the Board of Appeals in its decision dated June 26, 1952 rejected the claims in the parent case of the above entitled application primarily because *the specification did not contain sufficient data to support the critical minimum amount of dibasic ammonium phosphate necessary* in a dentifrice to inhibit the growth of lactobacillus acidophilus when used in vivo. *This data is included in the specification of the above entitled application at pages 14 to 23 and meets the primary objection of the Board of Appeals decision in the parent case.*" (Emphasis supplied.)

(B) Wach.

The Wach patent asserts a "synergistic" effect in the mixture of urea and a basic ammonium salt.

Both the parent 1947 application and the 1948 Wach continuation-in-part application (which became the patent) contain the following statement:

> "The amount of urea, however, should not exceed substantially the amount of ammonium compound and the amount of ammonium compound should not be substantially over three times the amount of urea where the synergistic effect is desired."

Wach thus requires that, for the desired effect, the amount of urea should not be much more than the amount of dibasic. He also states that the amount of urea should

not exceed 10% and neither the urea nor the basic ammonium salt should be less than 1%.

Wach originally sought to obtain an extremely broad claim for the use together of a basic ammonium salt and urea, unrestricted as to proportions. Both the 1947 parent application and the continuation-in-part application contained the following claim:

> "A dentifrice comprising urea, and a non-toxic, non-acid salt of ammonia."

But Wach was not permitted such a broad claim. He was required to restrict his claims to specific proportions of the two ingredients which he said were necessary to achieve his alleged "synergistic" effect.

Defendants' Formulations.

Defendants sold both a tooth paste and a tooth powder. These formulations were independently developed by Dr. Henschel who licensed the formulations to defendants. Defendants' products were on the market as early as 1946.

Defendants' tooth powder contained 22.5% urea and 5% dibasic, or 4½ times as much urea as dibasic. Defendants' tooth paste contained 13% urea and 3% dibasic, or 4⅓ times as much urea as dibasic. The amounts of urea in each formulation are in excess of Wach's 10% and the ratios are much higher than Wach's teaching that the amount of urea cannot "exceed substantially" the amount of the ammonium compound if the "synergistic" effect is desired. Yet each formulation was held to infringe Wach.

The Decisions Below.

In holding both patents valid and infringed by defendants' formulations, both the trial court and the Court of Appeals made several indefensible holdings. The specific holdings which we here contest are:

1. That Kesel's patent claims were entitled to the filing date of the parent 1947 application.

2. That the use of a minimum of 2% of dibasic can constitute invention.

3. That the use together of a basic ammonium salt and urea produces an unexpected synergistic (inventive) effect.

4. That Wach is infringed by a formulation which uses the two ingredients in ratios radically different from those limiting ratios which Wach says are necessary to achieve a synergistic effect.

REASONS FOR ALLOWANCE OF THE WRIT.

It is believed that this case presents issues of major importance in the administration of the patent laws. These issues warrant a clear expression of opinion from this Court.

There Should Not Be Different Tests for Patentability in Chemical and Mechanical Patent Cases.

This Court in the *A & P* case clearly stated the rule of patentability concerning the use together of two elements when it said (340 U. S. at 152):

> "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable."

The Court then went on to add a second sentence:

> "Elements may, of course, especially in chemistry or electronics, take on some new quality or function from being brought into concert, but this is not a usual result of uniting elements old in mechanics."

It is hard to believe that this Court, when it wrote the second sentence, intended to lay down an opposite rule for patentability in a case involving the mere mixture (without chemical reaction) of chemical elements from that in a case involving mechanical elements. Nevertheless, the statement has been so interpreted in this case. Unless clarified by this Court, the danger is clearly present that other courts will continue to apply a different standard in a chemical case than in a mechanical case with the result that in this extensive field, the requirements of invention, as defined by this Court, will become meaningless.

The Wach patent involves a simple mixture of two elements. No chemical reaction takes place, or is asserted to take place. No new compound is formed. Wach states:

> "I have found there was a synergistic action when employing a combination of dibasic ammonium phosphate and urea." (Column 2, lines 39-41.)

The word "synergism" is responsible for the question that has arisen.

The definition of synergism is remarkably similar to the requisite for patentability laid down by this Court in the first sentence of the *A & P* decision above quoted. Webster's New International Dictionary of the English Language, Second Edition, 1947, defines the word:

> "Synergism. 1. Physiol. Co-operative action of discrete agencies such that the total effect is greater than the sum of the two effects taken independently."

Clearly the simple mixture of two chemicals, both old in the art, must exert a synergistic effect, or the whole does not exceed the sum of the parts as required in the first quoted sentence of *A & P*. Two plus two must equal more than four under the test of *A & P;* patentability cannot be found merely because they add up to four.

In referring to Wach's bringing together of dibasic and urea the district court stated:

> "First, it is questionable whether synergism must be proved to obtain a patent on such a chemical compound." (Appendix C, p. 55.)

In support of this statement, the court then cites both sentences quoted above from *A & P*. The only conclusion that can be drawn from this is that the District Court interpreted the second quoted sentence of *A & P* to mean that the rule of the first quoted sentence does not apply to a chemical case. The rule applied by the District Court is apparently this: to find patentability in a mixture of two chemicals it is only necessary to mix the two chemicals for the first time, even though the chemicals are individually old for the purposes used.

While the Court of Appeals stated, "there is no occasion * * * to enter this discussion" (Appendix B, p. 40), it is manifest that it too must have felt that it was not necessary to show synergism to establish patentability in Wach's mixture. In this connection, it will be recalled that Wach states, "the amount of urea, however, should not exceed substantially the amount of the ammonium compound * * * *where the synergistic effect is desired.*" In sustaining the District Court's holding that two formulations, each containing more than four times as much urea as the ammonium compound, were infringements of Wach, no other conclusion can be drawn but that the Court of Appeals also felt that synergism was not a prerequisite for patentability.

We have shown above (pages 4-6) that the prior art taught the use of basic ammonium salts to reduce tooth decay. The prior art also taught the use of urea for the same purpose. And it was known to the art that urea had a "delayed action" because, when placed in the mouth, the urea slowly broke down into a basic ammonium salt, ammonium carbonate. It was therefore not in the least

unexpected that a mixture of the two chemicals should result in effectiveness for a greater period of time.

The Wach patent states that there is synergism. But the requirements of the *A & P* case cannot be met simply by stating that "synergism" exists; that is equivalent to meeting the test of *A & P* in a mechanical patent case by merely stating that "invention" exists.

Both courts below hastened to supplement the holding that synergism was not necessary by stating that the evidence showed synergism, but in the mere addition of the functions of the two active ingredients of the dentifrice.

The trial court made the following finding of fact:

> "The addition of urea to dibasic ammonium phosphate in a dentifrice produces a synergistic action, particularly in the fact that *the dibasic ammonium phosphate acts immediately and the urea more slowly or latently.*" (Finding No. 14, emphasis supplied.)

This is no more than a statement of the manner in which each ingredient acts independently; it is the 2 + 2 = 4 equation.

The trial court relied for its finding, not on any proof advanced by the patentees, but solely upon statements attributed to defendants, either in the prosecution of the Henschel patent under which they are licensed, or in advertising. In upholding the finding of the trial court, the Court of Appeals also relied only on statements attributed to defendants.

Quite apart from the fact that the statements attributed to defendants cannot serve to support plaintiff's patents in view of the public interest involved, nevertheless the statements relied upon do not show synergism. It is quite true that the word "synergism" was used, but no more weight can be attached to such statements than was attached to the statements of the patentees of the movable food counter

in the *A & P* case when they asserted that invention was involved in that device.

The trial court cites a quotation of Dr. Arnold J. Singer from the Henschel file wrapper which reads (App. C, p. 56):

> "Much less activity exists with lower concentrations of urea. A solution containing 5% diammonium hydrogen phosphate [dibasic] and 3% urea has only slightly more activity than diammonium hydrogen phosphate alone and the pH* of the tooth returns to its normal level within 20 to 40 minutes whereas the high urea concentration keeps the pH elevated for more than two hours."

This is merely a statement that the addition of more urea increases the lasting effect. Such a result is clearly to be expected in view of the known fact that urea acts latently.

The Court of Appeals selected the following statement from the Henschel file wrapper (App. B, p. 39):

> "The ammonium salt constituent performs a prompt and quick inhibiting action * * * and the urea *follows* with a slow and enduring protective action for hours after the ammonium salt has been washed out." (Emphasis supplied.)

Instead of showing any cooperative action between the dibasic and the urea, this quotation selected by the Court of Appeals merely recites the independent action of each chemical, which is the very action taught in the art.

This is not synergism. It does not become synergism because Wach said so, or because Henschel said so, or because the courts below said so.

Every pharmacist, doctor and drug manufacturer does exactly what Wach has done when he combines two therapeutic ingredients to achieve the desired effect of each ingredient in "one shot." If a patient were extremely nervous and also had a headache, a physician might well prescribe

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* Acidity and alkalinity are measured in terms of "pH."

two pills, (1) a tranquilizing drug to calm the patient and (2) aspirin for his headache. Certainly there would be no invention if that physician were to direct the dispensing pharmacist to combine the tranquilizer and the aspirin in a single pill for this treatment.

Wach has done no more than this. He has combined dibasic to achieve its known immediate effectiveness with urea for its known long lasting effectiveness. We cannot conceive that this Court intended the rule of the *A & P* case to condone the finding of invention under such circumstances.

The *A & P* decision has probably been cited more frequently since it was handed down than any other patent decision of this Court or any other court. The obvious misapplication of this landmark decision in the present case should not be permitted. It is important that this Court clarify its holding to prevent future patentees from removing from the public domain mixtures of old chemicals when the mixtures accomplish no more than the sum of the known effects of the individual chemicals.

A Patentee Should Not Obtain the Benefit of the Filing Date of an Earlier Patent Application Which Does Not Contain a Disclosure Necessary for Patentability.

In holding that Kesel was entitled to the benefit of the filing date of the parent 1947 application the courts below have created a new and dangerous concept in the patent law.

This holding raises a question which is new in this Court, insofar as we are aware. It is important that this Court rule on the question to prevent large numbers of patents being granted to those who are not true inventors, but who file applications containing inadequate

disclosures and unpatentable broad claims in the Patent Office, and at a later date add to their disclosures and modify their claims to encompass developments of others.

The holding below undermines one of the most important sections of the patent law. This section, 35 U. S. C., § 102, states that no person shall be entitled to a patent if:

> "(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States."

We have pointed out that Kesel did not present a patent application containing a disclosure which provided a basis for what he ultimately claimed as his invention until he filed his second continuation-in-part application in 1952. Long prior to that time, from 1946 on, defendants and others had marketed products defined by Kesel's claims. Unless Kesel is afforded the benefit of the filing date of the parent 1947 application, the Kesel patent is clearly invalid under the statute.

The Court of Appeals stated the matter in issue as follows:

> "In our view the most serious question arises from defendants' contention that defendants' alleged infringing products were on the market long before Kesel's disclosure in the Patent Office upon which his claims were allowed." (Appendix B, p. 35.*)

* The Court went on to add: "If this contention is sound, it means, of course, that Henschel was entitled to priority over Kesel, which would result in the invalidation of the latter's claims." This added statement is not a correct statement of defendants' position. Defendants did not contest in the Court of Appeals, nor are they contesting here, the trial court's finding that Kesel's initial work was prior to Henschel. It is defendants' position that if Kesel is not entitled to the 1947 filing date, his patent is clearly invalid under 35 U. S. C. § 102 b, by virtue of defendants' public use long prior to the filing date of the 1952 application.

Both the trial court and the Court of Appeals linked Kesel's second continuation-in-part application with the parent 1947 application in an astounding manner.

The Court of Appeals quoted a portion of the finding of fact of the District Court on this point which reads (Finding 9):

> "The final application of July 7, 1952 was entitled to the filing date of the earlier application as to all common subject matter." (Appendix B, p. 37.)

The Court of Appeals also quoted with approval the following statements of the trial court:

> "In this original application [the parent 1947 application] are two broad claims which fully cover the claims finally allowed in the patents: (a) 'A dentifrice comprising as an essential ingredient dibasic ammonium phosphate.' (b) 'A dentifrice comprising urea, and a non-toxic, non-acid salt of ammonia.' In a situation where the later applications refer back and are a continuation of the first application, the patent dates back to the time the original application was filed." (Appendix B, pp. 36-7.)

It was thus the broad claim which was originally presented in the parent 1947 application which was used by the courts below as a link between the original application and the 1952 second continuation-in-part. What the courts below failed to consider was that this broad claim was clearly unpatentable over the prior art and did not define what was ultimately claimed as Kesel's invention; and also that the original application contained no disclosure adequate to support what Kesel eventually claimed. Certainly the broad claim in the original application did not disclose or contemplate the criticality of the minimum of 2% dibasic upon which the ultimate patentability of Kesel was predicated. When Kesel filed his second continuation-in-part in 1952, he presented for the first time a disclosure that provided any support for the alleged crit-

ical minimum on which patentability was based, and that disclosure was based on new experimental work first done in the same year.

We do not disagree with the trial court's finding that the Kesel 1952 application was entitled to the date of the parent 1947 application

"as to all common subject matter."

But the matter added in the 1952 application was not subject matter common to the original application. It was new matter, and was admitted to be so (see letter from Kesel's attorneys, p. 8, above).

Plaintiff argued in the Court of Appeals that the new matter which was added to the second continuation-in-part was added merely as "proof of utility." This is not so, as the question of utility had already been resolved favorably to Kesel. While the first continuation-in-part had been rejected by the Examiner on the ground of lack of utility, the Board of Appeals held (Doc. App. 60):

> "In our opinion appellant's composition has utility for the purpose stated in the specification. We will not affirm the Examiner in his rejection of the claims on the ground of lack of utility."

The new matter was added, as stated by Kesel's attorneys, "to support the critical minimum amount of dibasic ammonium phosphate necessary." And it was added long after defendants' dentifrices were in public use.

A patentee cannot be permitted to accomplish such legerdemain. If this Court were to sanction such tactics, the Patent Office would be presented with a flood of inadequate applications on incomplete developments, containing broad, unpatentable claims claiming the moon, because the filing date of such an application would then be awarded more limited claims in a later application describing an invention subsequently made, providing only

that the claims in the later application which define the invention were within the scope of the broad, unpatentable claim in the first application.

In this case the courts below have sanctioned the device of filing and maintaining a broad unpatentable claim in the Patent Office, based on an inadequate and incomplete disclosure, to secure an early date, and filing successive applications on later developments until finally some development is disclosed upon which a limited patentable claim within the scope of the original broad claim can be presented. The broad claim is then dropped. Intervening public use and sale by others long before the final, adequate disclosure was made to the Patent Office are disregarded—the mere presence of the broad, unpatentable claim covers all the later developments that may be made within its scope, even though it never emerges from the Patent Office. To place this premium on the filing of incomplete disclosures and broad claims and on the purely technical device of holding such broad claims formally pending in the Patent Office, is, we submit, a perversion of the Patent Law.

Third Question—The Patentability of Proportions.

Although the persistence of Kesel was sufficient to wear down the Examiner into granting a patent based on an alleged critical minimum, the statements made by Kesel in his specification show that there can be no criticality in the 2% minimum. He states that a tooth powder "having 1% dibasic ammonium phosphate exerts some inhibiting control * * *." (column 10, lines 61-2.)

This raises the question whether the proportions selected by Kesel can in any event be termed "invention." The prior art taught the use of the ingredient and its effect in

reducing tooth decay. The sum and substance of Kesel's patent is that he confirmed the prior art and allegedly found as a matter of routine experiment that at least 2% ought to be used in a dentifrice. The man who, by trial and error, finds the proper amount of vermouth to place in a martini is entitled equally to a patent.

The third question arises with respect to the Wach patent because the same basis for holding Wach valid requires a holding that defendants have not infringed. If there is invention in putting two ingredients together in certain proportions, any combination outside those proportions cannot be the same product. Wach claims that an invention (synergism) exists because the two chemicals, when used in certain proportions, act together in a certain way. Defendants use different proportions. Either there is synergism or there is not. If there is not, the patent is invalid. If there is, defendants cannot infringe.

CONCLUSION.

For the foregoing reasons, it is requested that this petition for a writ of certiorari be granted.

Respectfully submitted,

BENJAMIN B. SCHNEIDER,
Attorney for Petitioners.

R. HOWARD GOLDSMITH,
WILLIAM R. LIBERMAN,
Of Counsel.

APPENDIX A.

Patented Dec. 16, 1952 2,622,058

(The matter which appeared for the first time in the specification of the 1952 continuation-in-part application is printed in red.)

UNITED STATES PATENT OFFICE

2,622,058

AMMONIATED DENTIFRICE

Robert G. Kesel, Aurora, Ill., assignor to The University of Illinois Foundation, a nonprofit corporation of Illinois

No Drawing. Application July 7, 1952, Serial No. 297,567

5 Claims. (Cl. 167—93)

1

This invention relates to a dentifrice containing a non-acid salt of ammonia in sufficient quantity substantially to inhibit locabacilli and particularly to inhibit lactobacilli under naturally-occurring conditions in the human mouth.

This application is a continuation-in-part of my copending application No. 52,396, filed October 1, 1948, which in turn was a continuation-in-part of application No. 721,156, filed January 9, 1947.

Numerous dental caries studies have reported the absence of certain aciduric bacteria, particularly the absence of *Lactobacillus acidophilus* from the oral flora of individuals who have no caries. It has been shown that saliva from individuals who have active caries contains not only a large concentration of *Lactobacillus acidophilus*, but also that such saliva has the power to convert glucose rapidly into acid, whereas saliva from persons with no active caries does not. Procedures designed to test for caries activity have been developed based upon these observations.

It has heretofore been suggested by Grove and Grove, Dental Cosmos, October 1934, that ammonium hydroxide in very low concentrations would be useful in a dentifrice for the solution of dental mucin. Investigation discloses, however, that the use of ammonium hydroxide at the levels indicated and even at amounts several times the maximums indicated by Grove and Grove stimulate lactobacilli. Furthermore, because of taste and chemical action, the use of ammonium hydroxide at the higher levels is not compatible with use in the mouth.

I have invented and am herein disclosing and claiming a dentifrice for the reduction in the number of *Lactobacillus acidophilus* in the oral cavity and the prevention of the rapid conversion of glucose into acid.

It is known that cultures of saliva from caries inactive subjects develop properties inhibiting the growth of *Lactobacillus acidophilus*, while cultures of the saliva from caries active subjects develop no such inhibitory properties. It is also known that the *Lactobacillus acidophilus* has the ability of rapidly converting glucose into acid and is in a large measure responsible for this action in the saliva of caries active persons.

It was discovered that inhibiting cultures produce ammonia nitrogen, while non-inhibiting cultures produce ammonia nitrogen at a much slower rate and in lesser amounts. It was further discovered that the addition of basic ammonium salts to a sterile broth medium produces a substance whose inhibitory ability parallels that of salivary cultures having a similar ammonia nitrogen concentration. All basic ammonium salts can be used and are effective, but the most effective when used alone is ammonium carbonate. Dibasic ammonium phosphate alone has a tendency to produce a stimulating effect on the growth of some undesirable bacteria when used in concentrations of less than 1%. Acid ammonium salts have no inhibitory characteristics.

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It was further discovered that many types of bacteria are present in the cultures of inhibitory saliva, but there is one bacterium, namely, *Bacterium lactis aerogenes*, consistently present. This organism has been established by me as an ammonifier acting upon the amino acids which I have found to be present in the saliva. The presence of at least twelve amino acids were found in human saliva and six deaminating systems, one of which systems is associated with *B. lactis aerogenes*—namely aspartic acid which is deaminated by ammonia by the products of *B. lactis aerogenes* and particularly asparagin. Non-inhibiting cultures from saliva of caries active subjects rarely contain the above-named bacterium. The use of the dentifrices herein described will promote the growth of this organism.

The above discoveries were made under laboratory conditions, and it was not known if the inhibiting properties of ammonia nitrogen could be successfully adapted for use in the oral cavities of humans. A dentifrice (the word "dentifrice" is herein used to include substances and compositions and solutions for introduction to the oral cavity, such as mouth washes, lozenges, chewing gum, tooth cleansers, and the like) containing a non-acid salt of ammonia will reproduce in dentated human similar reductions in the count of *Lactobacillus acidophilus* encountered in previous laboratory experiments.

To determine the effectiveness of these preparations on the oral flora, particularly the *Lactobacillus acidophilus* content, patients were selected from the dental clinic and student body who had a large number of carious lesions. *Lactobacillus acidophilus* count was made of the salivas and a count of 75,000 per ml. was arbitrarily chosen as an index of high caries activity. Fifty-five subjects were chosen with these higher counts. Confirmatory tests were made on four consecutive days to make sure that the high counts were consistent. The group was divided into two sections, one a control group and the other the experimental one. The c

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trol group consisting of ten persons was to use the preparations without the dibasic ammonium phosphate, and the experimental group was to use the ammonium containing mouth wash and powder.

The patients were instructed to brush their teeth thoroughly with the tooth powder and then to use about one tablespoonful of the mouth rinse and to move it vigorously over the entire mouth for two to three minutes. This was to be done on arising and before retiring for the night and they were also asked not to rinse the mouth with water after using the mouth rinse. No dietary or other instructions were given as it was desired to learn what the unaided effect of the ammonia might be. Patients were required to return at frequent intervals for lactobacilli counts.

The test findings are arranged in Tables I and II. The bacterial counts for lactobacilli in the saliva of each subject before the experiment commenced are shown in column A. These numbers are the average of salivary counts made on four consecutive days. The salivas were collected and were analyzed according to the Hadley method. The numbers in column B are the average of the last two lactobacilli counts made in the same manner from the same individuals after approximately five months' use of the rinse and dentifrice. The numbers in column C (Table II) are the lactobacilli counts for those of the group who continued using the powder and rinse for one year.

TABLE I

(Control group)

Effects of five months' clinical usage of mouth rinse and dentifrice containing no ammonia on lactobacilli counts

Subject	A	B	Subject	A	B
1	268,000	324,000	6	424,000	388,000
2	810,000	670,000	7	270,000	412,000
3	250,000	144,000	8	160,000	220,000
4	72,000	132,000	9	400,000	415,000
5	110,000	128,000	10	324,000	336,000

TABLE II

(Test group)

Effects of twelve months' clinical usage of a mouth rinse and dentifrice containing ammonia on lactobacilli counts

Subject	A	B	C	Subject	A	B	C
11	600,000	60,000	No growth.	24	240,000	70,000	No growth.
12	420,000	280,000		25	1,200,000	14,000	Do.
13	200,000	24,000		26	1,400,000	220,000	60,000.
14	410,000	32,000	1,200.	27	270,000	110,000	12,000.
15	280,000	No growth.	1,600.	28	280,000	No growth.	
16	800,000	70,000	13,000.	29	140,000	28,000	No growth.
17	1,400,000	28,000		40	420,000	168,000	4,000.
18	140,000	42,000		41	280,000	14,000	No growth.
19	1,200,000	10,000	110,000.	42	280,000	No growth.	14,000.
20	800,000	140,000		43	72,000	do	
21	280,000	110,000	18,000.	44	110,000	28,000	1,200.
22	120,000	10,000		45	280,000	6,000	No growth.
23	21,000	1,200	No growth.	46	1,400,000	110,000	40,000.
24	280,000	14,000	do	47	720,000	280,000	14,000.
25	672,000	No growth.	2,000.	48	280,000	2,000	No growth.
26	270,000	42,000		49	800,000	168,000	110,000.
27	280,000	28,000		50	280,000	No growth.	2,800.
28	1,400,000	168,000	28,000.	51	280,000	70,000	12,000.
29	612,000	28,000	No growth.	52	120,000	280	No growth.
30	280,000	1,200	4,000.	53	400,000	No growth.	
31	168,000	42,000		54	224,000	28,000	No growth.
32	470,000	28,000	No growth.	55	700,000	28,000	2,000.
33	280,000	140,000	14,000.				

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group. The exception was an individual who was not cooperative in using the dentifrice and rinse. Despite the apparent huge reduction in the counts in most of the cases, it is evident that some of the counts remained relatively high.

The study was continued for approximately one year and the number of subjects was expanded to 122. The results in the additional groups have been the same, that is, invariably there is an almost immediate reduction of lactobacilli. In some individuals the organism disappeared only to reappear sporadically. Preliminary checks revealed no gingival irritation from the ammonia preparations and the teeth were notably free from materia alba and bacterial plaques.

Because of the persistent although reduced lactobacilli counts in the clinical subjects, it was decided to investigate further with ammonia liberating preparations in order to obtain a more permanent result.

Tables III to VI show the effect of a five per cent dibasic ammonium phosphate solution on total acid production, lactic acid formation, ammonia nitrogen production, and the aciduric bacterial flora, in the saliva of the same individual collected on a different day. The dibasic ammonium phosphate maintained the hydrogen ion concentration on the alkaline side in the presence of glucose although total titratable acids were developed during the forty-eight hour incubation period to almost the same level as occurred in the saliva without the ammonium phosphate. Equivalent amounts of lactic acid were produced in the saliva with and without the dibasic ammonium phosphate during forty-eight hours' incubation although the ammonia did have a reducing effect on lactic acid production as shown by the difference at the four hour period. The analyses for ammonia nitrogen revealed that there was a reduction in ammonia in the presence of dibasic ammonium phosphate for reasons we do not know. The dibasic ammonium phosphate eliminated *Lactobacillus acidophilus* from the saliva during twenty-four hours' incubation, but permitted the development of coccal organisms of the streptococcus and staphylococcus varieties. No bacteria survived the forty-eight hour incubation period.

In every instance except one the lactobacilli counts were markedly reduced in the group using the ammonia preparations whereas an increase or only a slight decrease was observed in the control

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TABLE III

Effect of 5% dibasic ammonium phosphate solution on acid production

Tube	Initial		4 hours—37° C.		24 hours—37° C.		48 hours—37° C.	
	pH	T. T. acid [1]	pH	T. T. acid [1]	pH	T. T. acid [1]	pH	T. T. acid [1]
A	7.0	0.20	7.1	0.10	7.2	.....	7.4	.....
B	7.0	.20	4.5	1.50	4.0	2.60	3.9	3.00
C	7.7	Alk.	7.7	Alk.	7.7	Alk.	7.7	Alk.
D	7.78	Alk.	7.8	Alk.	7.4	1.0	7.0	2.80

Tube A=3 ml. saliva+3 ml. distilled water.
Tube B=3 ml. saliva+1.0 ml. 20% glucose solution+4 ml. distilled water.
Tube C=3 ml. saliva+4 ml. dibasic ammonium phosphate solution+1 ml. distilled water.
Tube D=3 ml. saliva+4 ml. dibasic ammonium phosphate solution+20% glucose solution (1 ml.).
[1] Total titratable acidity determined using N/100 NaOH.

TABLE IV

Effect of 5% dibasic ammonium phosphate solution on lactic acid production [1]

Tube	Initial	4 hours—37° C.	24 hours—37° C.	48 hours—37° C.
A	0.146	0.146	0.146	0.146
B	.146	.540	1.345	1.780
C	.146	.146	.146	.146
D	.146	.180	1.338	1.690

[1] Reported in mg. per ml. tube contents.
Tube contents same as above.

TABLE V

Effect of 5% dibasic ammonium phosphate solution on ammonium nitrogen level [1]

Tube	Initial	4 hours—37° C.	24 hours—37° C.	48 hours—37° C.
A	0.081	0.008	Trace	.....
B	.081	.....	.....	.....
C	3.481	3.450	3.410	3.382
D	3.481	3.361	2.74	2.182

[1] Reported in mg. per cent per ml. tube contents.

TABLE VI

Effect of 5% dibasic ammonium phosphate solution on aciduric flora

Tube	Initial colony counts	24 hours—37° C.	48 hours—37° C.
A	264,000	245,000	228,000.
B	248,000	1,003,000	Uncountable.
C	280,000	No lactobacilli 35,000 coccal colonies.	No growth.
D	270,000	No lactobacilli 11,200 coccal colonies.	Do.

While ammonium phosphate is preferred, other alkaline ammonium salts may be employed in its place. Ammonium carbonate is a valuable salt for this purpose, but its instability reduces its value in a dentifrice.

One formula for a mouth rinse is as follows:

	Gm. or cc.
Dibasic ammonium phosphate	50.0
Glycerin	100.0
Liquor amaranth (U. S. P.)	2.0
Soluble saccharin	1.0
Aqua menthae piperitae, q. s.	1,000.0

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One formula for a tooth powder is as follows:

Inert polishing agent	gm... 50.0
Soluble saccharin	gm... 2.0
Oil of peppermint	cc... 4.0
Oil of cinnamon	cc... 2.0
Methyl salicylate	gm... 8.0
Dibasic ammonium phosphate	gm... 50.0
Precipitated calcium carbonate	gm... 884.0

It has heretofore been proposed to employ ammonium hydroxide in a dentifrice for the purpose of dissolving mucin plaques from the teeth by the use of very small proportions of ammonia. Such proportions are not effective to destroy lactobacilli and, in fact, may encourage their growth.

If the amount of ammonium salt used is too small, it may likewise encourage the growth of the bacteria rather than their control.

While ammonium carbonate is apparently the most effective salt of ammonia in small concentrations, it is unstable and, therefore, it is not particularly desirable in a dentifrice which is to be sold on the market and may have to be stored for a considerable period of time. Its palatability is likewise not of the highest order.

Dibasic ammonium phosphate has proved to be by far the most important and desirable salt of ammonia. This material has not heretofore been suggested for use as a dentifrice ingredient. It may be employed as the sole ammonia producing ingredient or it may be fortified by other salts of ammonia, so long as the dentifrice provides a non-acid integration of the whole.

Small amounts of dibasic ammonium phosphate in the oral environment can cause a stimulation of the growth of lactobacilli and it is, therefore, important that the dentifrice should contain sufficient of the material that under normal conditions of use and dosage the bacteria will be inhibited rather than stimulated.

It is obvious that the proportions in the dentifrice itself depend somewhat upon the dosage of the dentifrice to be employed since the saliva dilutes the dentifrice and this must be taken into consideration. For example, a powder is normally used in less amount than a paste and for that reason it may be desirable to employ a higher or at least a greater margin of safety in a powder than in a paste. I have found, however, that usage of 5% dibasic ammonium phosphate, either in a powder or in a paste, produces the most satisfactory, all around results.

Under carefully controlled conditions, a powder dentifrice having 3% dibasic ammonium phosphate exerts extraordinary control of the bacteria and I have in some cases found an improved control at 3% as compared to 5%. The 5% level is preferred, however, because of stability factors and margin of safety.

Above 5%, the limiting factor is largely one of taste and palatability. Normally, any amounts above 5% may be considered as unnecessary diluents or extenders. It is theoretically possible to employ a dentifrice with say 10% of dibasic ammonium phosphate, using only a half dose to produce an ultimate solution in the mouth in the same order as that which would be produced by using twice as much of the 5% material. However, up to the present this has proved impracticable because of the palatability factor.

I have found that the lower range for dibasic ammonium phosphate for safe use is above 1%. A dentifrice powder including 1% dibasic ammonium phosphate will exert inhibitory control

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of lactobacilli in some individuals. It may be considered as borderline control at this level, and it is possible that the determining factor is the dilution which occurs in the mouth of the patient.

Excellent results have been obtained in all patients treated using a powder containing 2% of dibasic ammonium phosphate allowing for ordinary dilution in the mouth. I thus prefer to use not substantially less than 2% of the material in a dentifrice powder.

In a paste the amount of material employed may be increased and thus the dilution factor reduced. Nevertheless, even in a paste I do not prefer to use substantially less than 2% of the material in order to have a safe working margin and to provide for possible loss of effectiveness of the dentifrice over periods of time.

It is highly useful to employ urea with the non-acid ammonium salt. Mixtures of 2% dibasic ammonium phosphate plus 2% of urea exert excellent control. The combination of 5% dibasic ammonium phosphate with 3% urea as disclosed in Wach Patent No. 2,542,886 is particularly advantageous. Amounts of urea above approximately 10% exert an effect which is at least temporarily deleterious to certain functions of the oral environment, with the result that there is at least a considerable lag in lactobacilli control. However, the use of such higher proportions of urea does not overcome the valuable functions of the dibasic ammonium phosphate under most conditions.

With ammonium carbonate, lower proportions may exert control and as little as 1% in solution is highly inhibitory. Even with this compound, however, the preferred range is not substantially less than 2% in order to exert effective control over long periods of time, particularly since the salt is highly unstable and cannot be counted upon to remain at its original proportion.

A series of tests were conducted on subjects to determine the effectiveness of water, a non-ammoniated dentifrice and different concentrations of dibasic ammonium phosphate in toothpowders on the *Lactobacillus acidophilus* content of the subjects' saliva. The following procedure, devised and carried out by Dr. Joseph F. O'Donnell of the University of Illinois College of Dentistry, was employed.

For each test, subjects were selected from the University of Illinois Dental Clinic and student body whose lactobacilli count per c. c. of saliva exceeded 10,000 and who had not used previously an ammoniated dentifrice. For each test, the subject was permitted to rinse his mouth upon waking in the morning before eating his breakfast. Within from 45 to 60 minutes after eating breakfast, he submitted the first of five 2 c. c. samples of saliva in a sterile container. The subject then brushed his teeth vigorously for one minute with the particular type of toothpowder to be tested, using from 1 to 1.5 grams of the toothpowder. After spitting out the excess liquid in his mouth resulting from the brushing, the subject then submitted the second sample of his saliva, which is the saliva sample taken immediately after brushing. The subject then submitted three other samples of his saliva, one taken 5 minutes after the second sample, one taken 30 minutes after the 5 minute sample, and one taken 90 minutes after the 30 minute sample. For the series of tests in which tap water was employed instead of toothpowder, each subject

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rinsed his mouth for one minute after brushing while moving 20 c. c. of tap water vigorously over the entire mouth and then submitted the second sample of saliva.

To avoid any possible action of the medicaments in the toothpowders which may have been in contact with the saliva of the samples submitted, the first three samples were cultured immediately on collection.

The saliva samples were cultured and analyzed according to the Faith Hadley technique. After thoroughly mixing a 2 c. c. sample of the collected saliva in order to break up any clumps of bacteria, 1 c. c. of the saliva was added to 4 c. c. of distilled, sterile water. 0.1 c. c. of this diluted saliva was then deposited on Tomato Agar having a pH of 5 and spread uniformly thereover, allowed to stand for 10 minutes at room temperature, and then incubated for 4 days at a temperature of about 37° C. After incubation, the lactobacilli colonies were counted.

The test findings have been arranged in Tables VII to XII. The bacterial count in thousands for lactobacilli per c. c. of saliva of each subject 45 to 60 minutes after eating breakfast and before brushing are shown in columns B. The lactobacilli counts in thousands immediately after brushing are shown in columns A; the lactobacilli counts in thousands 5 minutes after brushing are shown in the columns designated "5 Min.," the lactobacilli counts in thousands 30 minutes after the 5 minute samples are shown in the columns designated "30 Min.," and the lactobacilli counts in thousands 90 minutes after the 30 minute samples are shown in columns designated "90 Min."

Table VII in column 8 shows the effect of brushing and rinsing with tap water on the lactobacilli count in the mouth.

Table VIII in column 9 shows the effect of brushing with a non ammoniated dentifrice on the lactobacilli count in the mouth.

Tables IX to XII in columns 9 and 10 show the effect of brushing with an ammoniated toothpowder containing 1%, 2%, 3% and 5% dibasic ammonium phosphate respectively on the lactobacilli count in the mouth.

TABLE VII

Effect of brushing and rinsing with tap water on lactobacilli counts

Subject No.	B	A	Percent diff.	5 min.	Percent diff.	30 min.	Percent diff.	90 min.	Percent diff.
1	34.65	82.5	222.0	86.0	134.0	88.0	153.0	84.2	119.0
2	21.1	17.0	−19.4	21.5	1.9	13.45	73.5	25.15	19.2
3	11.75	20.5	74.4	13.15	3.4	10.1	−14.1	13.05	26.1
4	182.5	228.0	47.5	200.0	31.2	183.0	20.3	142.5	−2.6
5	21.5	18.5	−14.0	23.0	7.0	20.0	−5.3	20.05	−5.3
6	88.0	80.3	46.4	83.0	−4.8	66.0	9.1	83.0	14.5
7	140.0	80.4	−42.5	160.1	−28.6	110.0	−21.4	185.0	10.7
8	21.0	50.0	181.0	37.0	38.6	31.65	51.0	22.5	7.1
9	7.2	16.0	122.0	9.0	38.0	9.8	36.0	12.5	72.0
10	104.0	122.0	18.3	94.5	−9.1	67.5	−35.0	108.0	1.9
11	122.0	133.0	9.0	120.0	1.6	153.0	37.0	108.0	13.9
12	56.0	21.1	−15.6	22.05	−11.8	70.0	4.0	58.0	52.0
13	77.0	137.0	78.0	121.0	57.0	119.0	54.5	125.0	62.4
14	50.0	85.0	44.0	87.0	67.4	110.5	88.5	114.0	98.5
15	60.0	130.0	185.0	170.0	137.0	160.0	167.0	75.0	25.0
16	18.0	25.5	70.0	53.0	233.0	35.25	183.0	25.05	67.0
17	704.0	[1] T		[1] T		[1] T		676.0	4.1
18	35.0	22.5	−34.7	27.0	−22.6	27.0	5.7	45.0	28.6
19	28.6	75.8	166.0	55.5	117.0	55.45	93.4	52.9	28.6
20	127.0	208.9	65.0	93.7	26.2	81.6	34.9	144.1	13.45
21	803.4	302.5	−51.4	320.9	−42.0	221.0	38.1	282.5	13.7
22	182.5	138.0	−23.6	243.5	33.4	211.7	16.0	172.2	−1.65
23	5.2	7.0	34.6	5.0	−3.9	5.0	−3.9	6.8	30.0
24	38.5			30.1	−21.9	52.1	34.5	52.15	35.4
25	140.0	80.35	−42.5	160.1	38.5	110.0	−21.4	185.0	10.7

[1] The number of lactobacilli colonies were too numerous to count.

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TABLE VIII

Effect of brushing with non-ammoniated toothpowder [1] on lactobacilli counts

Subject No.	B	A	Per-cent diff.	5 min.	Per-cent diff.	30 min.	Per-cent diff.	90 min.	Per-cent diff.
1	18.7	100.0	435.0	61.0	226.0	83.0	74.9	28.1	34.2
2	16.3	29.0	77.9	41.0	152.0	12.5	−23.3	16.5	1.23
3	12.1	26.0	115.0	22.68	87.2	8.25	−31.8	14.25	17.8
4	152.5	225.0	47.5	200.0	31.2	183.0	19.7	148.45	−2.65
5	23.0	75.0	226.0	26.0	13.0	25.0	8.7	30.0	30.4
6	42.0	73.4	79.5	32.0	23.8	35.6	16.7	45.0	7.14
7	35.0	60.0	71.5	40.0	14.3	23.5	−32.9	33.5	1.43
8	13.75	44.0	222.0	23.2	68.6	29.5	114.5	17.0	23.6
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[1] Ingredients of non-ammoniated toothpowder employed:

Calcium phosphate	gm.	10.0
Soluble saccharin	gm.	0.4
Menthol	gm.	0.4
Calcium carbonate precipitate	gm.	189.2
Oil of peppermint	cc.	0.4
Oil of cinnamon	cc.	0.4
Oil of wintergreen	cc.	1.2
Sodium lauryl sulfate	gm.	2.0

TABLE IX

Effect of brushing with ammoniated toothpowder [1] containing 1% dibasic ammonium phosphate

Subject No.	B	A	5 min.	30 min.	Per-cent diff.	90 min.	Per-cent diff.
1	18.5	95.0	48.0	72.0	304.0	8.75	−43.8
2	32.35	[2] T	[2] T	35.5	9.76	30.2	−6.64
3	105.2	172.75	177.75	14.25	−86.5	8.75	−91.8
4	65.2	91.7	100.55	26.05	−60.0	21.15	−86.8
5							
6	16.0	65.15	85.1	2.7	−83.2	.9	−94.5
7							
8	9.85	78.0	16.0	8.0	−18.8	8.0	−18.8
9							

[1] Ingredients of ammoniated toothpowder employed:

Dibasic ammonium phosphate	gm.	1.0
Calcium phosphate	gm.	5.0
Soluble saccharin	gm.	0.2
Menthol	gm.	0.2
Calcium carbonate precipitate	gm.	86.6
Oil of peppermint	cc.	0.2
Oil of cinnamon	cc.	0.2
Oil of wintergreen	cc.	0.6
Sodium lauryl sulfate	gm.	1.0

[2] The number of lactobacilli colonies were too numerous to count.

TABLE X

Effect of brushing with ammoniated toothpowder [1] containing 2% dibasic ammonium phosphate

Subject No.	B	A	5 min.	30 min.	Per-cent diff.	90 min.	Per-cent diff.
1	230.0	310.0	183.0	126.5	−49.4	181.0	−27.6
2	19.15	[2] T	[2] T	12.0	−37.3	5.0	−68.6
3	62.5	89.0	10.0	.45	−99.3	10.15	−83.6
4	31.5	186.15		1.95	−93.6	.5	−98.5
5							
6	25.2	35.15	50.1	1.0	−96.0	.2	−99.2
7							
8	24.0	52.0	13.5	6.2	−74.2	2.6	−89.2
9							

[1] Ingredients of ammoniated toothpowder employed:

Dibasic ammonium phosphate	gm.	1.92
Calcium phosphate	gm.	5.0
Soluble saccharin	gm.	0.2
Menthol	gm.	0.2
Calcium carbonate precipitate	gm.	86.6
Oil of peppermint	cc.	0.2
Oil of cinnamon	cc.	0.2
Oil of wintergreen	cc.	0.6
Sodium lauryl sulfate	gm.	1.0

[2] The number of lactobacilli colonies were too numerous to count.

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TABLE XI

Effect of brushing with ammoniated toothpowder [1] containing 3% dibasic ammonium phosphate

Subject No.	B	A	5 min.	30 min.	Per-cent diff.	90 min.	Per-cent diff.
1	53.5	73.0	7.0	2.9	−94.9	3.6	−93.
2	20.15	[2] T	65.0	3.6	−82.3	1.0	−95.
3	65.0	130.5	41.0	.9	−99.0	1.3	−98.
4	135.0	208.15	81.5	26.5	−80.4	41.0	−69.
5							
6	68.1	25.0	14.5	8.0	−88.3	.3	−99.
7							
8	20.0	50.0	12.0	6.0	−70.0	1.1	−94.
9							

[1] Ingredients of ammoniated toothpowder employed:

Dibasic ammonium phosphate	gm.	2.9
Calcium phosphate	gm.	5.
Soluble saccharin	gm.	0.
Menthol	gm.	0.
Calcium carbonate precipitate	gm.	86.
Oil of peppermint	cc.	0.
Oil of cinnamon	cc.	0.
Oil of wintergreen	cc.	0.
Sodium lauryl sulfate	gm.	1.

[2] The number of lactobacilli colonies were too numerous to count.

TABLE XII

Effect of brushing with ammoniated toothpowder containing 5% dibasic ammonium phosphate

Subject No.	B	A	5 min.	30 min.	Percen[illegible]	90 min.	Per-cent diff.
26	26.1	76.5	40.1	20.6	−23.4	10.15	−61.
27	65.2	91.7	100.55	26.05	−60.3	21.15	−67.
28	20.2	63.1	20.5	10.2	−98.4	10.55	−63.
29	29.0	300.0	41.0	10.5	−83.7	1.6	−94.
1	35.2	53.0	16.0	2.75	−92.4	.4	−98.
6	41.0	60.0	25.0	16.0	−60.9	.6	−98.

[1] Ingredients of ammoniated toothpowder employed:

Dibasic ammonium phosphate	gm.	10.
Calcium phosphate	gm.	10.
Soluble saccharin	gm.	0.
Menthol	gm.	0.
Calcium carbonate precipitate	gm.	179.
Oil of peppermint	cc.	0.
Oil of cinnamon	cc.	0.
Oil of wintergreen	cc.	1.
Sodium lauryl sulfate	gm.	2.

From the data in Tables VII and VIII, it is readily seen that brushing with either tap water or a non-ammoniated dentifrice fails to effectively reduce the lactobacilli in the saliva. Instead, the lactobacilli count of practically all of the patients increased over a period of 125 minutes after brushing with either tap water or a non-ammoniated dentifrice.

On the other hand, brushing in the manner previously described with a toothpowder containing the same ingredients employed in obtaining the results in Table VIII, but in addition having 1% dibasic ammonium phosphate, exerts some inhibitory control over lactobacilli. This is evident from the data in Table IX. However, the inhibitory effect of an ammoniated toothpowder containing 1% dibasic ammonium phosphate is marginal. After the 125 minute test period, the lactobacilli count of only two of the subjects was reduced by more than 90% of the count prior to brushing, whereas one of the subject's count was only reduced 6.6% and another only 18.8%, while the remaining two subjects had a lactobacilli reduction of 43.5% to 66.5%.

As readily seen from Tables X to XII, excellent results were obtained using concentrations of

from 2% to 5% dibasic ammonium phosphate in the toothpowder.

The foregoing detailed description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

I claim:

1. A dentifrice comprising a non-toxic carrier adapted for oral administration and dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being not substantially less than 2% of the composition, and a flavor masking ingredient.

2. A dentifrice comprising a non-toxic, palatable carrier adapted for oral administration containing dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being not substantially less than 2% of the composition, and a flavor masking ingredient.

3. A dentifrice comprising a non-toxic, palatable carrier adapted for oral administration containing dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being not substantially less than 2% of the composition, a polishing agent, and a flavor masking ingredient.

4. A non-liquid dentifrice comprising a non-toxic, palatable carrier adapted for oral administration containing dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being not substantially less than 2% of the composition, and a flavor masking ingredient.

5. A dentifrice comprising a non-toxic, palatable carrier adapted for oral administration containing dibasic ammonium phosphate in an amount of from 2–5% of the composition and in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli, and a flavor masking ingredient.

ROBERT G. KESEL.

REFERENCES CITED

The following references are of record in the file of this patent:

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The Journal of the Society of Cosmetic Chemists, "Dental Caries Symposium," December 1950, volume II, Number 2, pages 87 to 97.

The Manufacturing Chemist and Manufacturing Perfumer (1), November 1949, pages 527 and 538.

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Stephan et al.: "Effectiveness of Urea and of Synthetic Detergents in Reducing Activity of Human Dental Caries," Proc. Soc. Exp. Biol. & Med., February 1944, pages 101 to 104.

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APPENDIX B.

IN THE UNITED STATES COURT OF APPEALS

For the Seventh Circuit.

No. 11605 September Term, 1956, January Session, 1957

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Plaintiff-Appellee,
v.
BLOCK DRUG CO., AMM-I-DENT, INC., and F. W. WOOLWORTH CO.,
Defendants-Appellants.

Appeal from the United States District Court for the Eastern District of Illinois.

January 16, 1957

Before MAJOR, FINNEGAN and SCHNACKENBERG, *Circuit Judges.*

MAJOR, *Circuit Judge.* This is an action alleging infringement of two patents: No. 2,542,886, entitled "Dentifrice," granted February 20, 1951, to Edward C. Wach, and No. 2,622,058, entitled "Ammoniated Dentifrice," granted December 16, 1952, to Robert G. Kesel. (The former will hereinafter be referred to as the Wach and the latter as the Kesel patent.) Plaintiff, The University of Illinois Foundation, acquired the patents by assignment from Wach and Kesel. Both patents relate to dentifrice compositions intended to prevent dental caries or tooth decay, or to inhibit the development of a particular or-

ganism, lactobacillus acidophilus, usually present in human saliva.

Defendant F. W. Woolworth Co. was charged with infringement by the sale at its store in East St. Louis, Illinois, of tooth paste and tooth powder under the name of "Amm-i-dent," which allegedly embodies the inventions of the patents in suit. Defendant Amm-i-dent, Inc. was charged with the manufacture of Amm-i-dent which it sold to defendant Block Drug Co., who in turn made distribution to the retail trade, including defendant Woolworth.

A patent was issued to Chester J. Henschel February 20, 1951 (the same date as the issuance of the Wach patent), entitled "Dentifrice." Henschel licensed the manufacture and sale of Amm-i-dent by defendants Amm-i-dent, Inc. and Block. During the course of the proceeding the suit was dismissed as to Henschel who originally was made a party-defendant.

Defendants relied upon the defenses of invalidity and non-infringement. Invalidity was asserted because (1) Henschel's patent is entitled to priority over plaintiff's patents, (2) plaintiff's patents are anticipated by the prior art or, in any event, do not show invention in view of such art, and (3) plaintiff's patents are without utility. The District Court, after a long trial in which a voluminous record was made, rendered an opinion in which all material issues were discussed and decided adversely to defendants. Following such opinion and in conformity therewith, the Court entered its findings of fact and conclusions of law, and on August 4, 1955, its decree sustaining the validity of both patents, as well as the charge of infringement by defendants. From this decree defendants appeal.

In this Court defendants contend (1) that both the Kesel and Wach patents are invalid, and (2) that even though the validity of Wach be sustained, there is no in-

fringement by defendants. The utility of the product manufactured in accordance with the teachings of Kesel and Wach is conceded and no issue is raised here but that defendants infringe Kesel, if valid.

The problem with which the dental profession was concerned and to which the patents in suit relate was dental decay. The opinion of the District Judge contains a statement concerning the problem confronting the profession, as well as the work done by the patentees, Dr. Kesel and Dr. Wach, about which there seems to be no controversy and which we adopt. (This includes the three paragraphs which immediately follow.)

The cause of dental caries (dental decay) has been studied for a good many years. It has generally been an accepted theory that a bacterium, called lactobacillus acidophilus, is found in the saliva and is associated with decayed teeth. Dr. Robert Kesel began a study of the individuals whose teeth were decay resistant and those whose teeth were not. He graduated from the College of Dentistry of the University of Illinois in 1926, with a degree of D.D.S. and from the University of Illinois Medical School in 1931, receiving an M.S. in Bacteriology. Since 1936 he has been head of the Department of Applied Materia Medica and Therapeutics of the College of Dentistry of the University of Illinois. From this study it was determined that there was an amount of ammonia in the saliva of caries inactive individuals which had the ability to inhibit lactobacilli, and that the amount was greater than normally produced by the breaking down of urea in the saliva. This indicated there was some source of ammonia in the mouth in addition to the salivary urea. Dr. Kesel's method was unusual. As early as 1941 or 1942 he and two of his students, Berry and Orland, all three being caries inactive, placed the incubated saliva of caries ac-

tive individuals in their mouths. They found that the micro-organism in the saliva they placed in their mouths disappeared. Even when sugar was added these organisms disappeared in 24 hours. This indicated there was something in their saliva which overcame this bacteria. They found this to be aerogenes bacteria which were capable of producing ammonia. A great deal of experimental work in vitro (in test tubes) with saliva was performed. The problem was then presented as to how to raise the ammonium content of the saliva of caries active individuals. Dr. Kesel had working with him Drs. Wach, Kirch and O'Donnell, all of whom were connected with the College of Dentistry of the University of Illinois. They found that alkaline salts of ammonium when added to the saliva stimulated the aerogenes bacteria inhibiting lactobacillus, but that acid salts did not. They selected dibasic ammonium phosphate (hereinafter referred to as dibasic) as the preferred ammonium salt. From time to time in 1944 and 1945, patients with decayed teeth were referred to the group at the University of Illinois Dental School. It was found, with few exceptions, that patients who were administered dibasic had a lower lactobacillus count after three or four months' use.

Sometime before the fall of 1945, Dr. Wach suggested the additional use of urea. In the fall of 1945 or early winter of 1946, tests were made using the combination of urea and dibasic. Their experimental work disclosed the supporting action between dibasic and urea. In the early part of 1948, in Peoria, Illinois, they began study on school children which lasted for about two years. The tests were made with a combination of dibasic and urea dentifrice.

Dr. Kesel appears to have been the spokesman of the group. He reported the findings to the Chicago Dental Society on February 13, 1946, including the test with

dibasic dentifrice on some 55 individuals. This report was awarded the annual prize of the Chicago Dental Society for research investigation. He next read a paper October 9, 1946, at Palm Springs, California, on the subject of "Ammonium Production of Oral Cavities and the Use of Ammonium Salts with Control of Dental Caries." In this paper printed in the Journal of Oral Surgery, Dr. Kesel explained the experiments using urea and dibasic. He gave further lectures before Dental Societies and wrote various articles on the experimental work that had been done.

The labors and efforts of Drs. Kesel and Wach culminated in the issuance of the Kesel and Wach patents in suit. During substantially the same period, Dr. Chester J. Henschel, a practicing dentist in New York City and Chief of Dentistry at Sydenham Hospital in New York, was also interested in the same problem and his efforts culminated in the issuance of a patent to him under which defendants are licensed to manufacture and sell "Amm-i-dent."

The Kesel patent contains five and the Wach patent eight claims. Claim 1 of Kesel and Claim 6 of Wach appear to be recognized as typical. The former reads as follows:

> "A dentifrice comprising a non-toxic carrier adapted for oral administration and dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being not substantially less than 2% of the composition, and a flavor masking ingredient."

The latter reads as follows:

> "A dentifrice comprising a major portion of a non-toxic, non-sugary carrier adapted for oral administration, containing from 1 to 10 parts by weight of urea and from 1 to 7 parts by weight of a dibasic am-

monium phosphate, there being at least 1% by weight of urea and at least 1% by weight of the phosphate present in said dentifrice."

Claim 1 of the Henschel patent, which appears to be typical of its four claims, reads as follows:

"A powdered dentifrice including the following ingredients in substantially the following proportions by weight:

	PARTS
Urea	15 to 50
Di-ammonium hydrogen phosphate	7 to 4
Abrasive	71 to 34"

Defendant Woolworth sold Amm-i-dent both in powder and paste form. Insofar as material to the instant case, the former contained 22.5% urea and 5% di-ammonium phosphate. The latter contained 13% urea and 3% di-ammonium phosphate.

Defendants, without attacking any specific finding of the trial Court, present their case here as though it were a trial *de novo*. An attempt is made to justify this course on the theory that on both the issues of validity and infringement nothing is involved but a consideration of the prior art and statements of the patentees, together with parol evidence explanatory of the prior art. It is contended that such matters "may therefore be considered by this court notwithstanding the findings of the trial court." In support of this premise defendants rely upon three decisions of this Court: *Sales Affiliates, Inc.* v. *National Mineral Co.*, 172 F. 2d 608, 613, cert. den. 337 U. S. 940; *Peckat Mfg. Co. et al.* v. *Jacobs*, 178 F. 2d 794, 802, cert. den. 339 U. S. 915, and *Falkenberg* v. *Golding et al.*, 195 F. 2d 482, 486.

A reading of these cases readily discloses that they are without application to the instant situation where there was a large amount of so-called prior art, most of which

was couched in highly technical language the meaning and significance of which formed the basis for much controversy. There was marked conflict among the expert witnesses as to the teachings of the prior art, as well as its application or relevancy to the problem with which the dental profession was confronted and which Kesel and Wach sought to alleviate. The case is clearly one which calls for the application of Rule 52 (a) of the Federal Rules of Civil Procedure, 28 U. S. C. A., which provides, "Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses." This Court in *O'Brien* v. *O'Brien*, 202 F. 2d 254, 255, made a statement particularly pertinent and applicable to the instant situation, and which we think bears repeating, as follows:

> "The District Court made extensive findings of fact, both on the issue relating to invention and that of infringement. A reading of the testimony, particularly that of the expert witnesses, is convincing that the record furnishes substantial support for such findings. True, there is evidence favorable to defendant's theory of the case, at least on certain subsidiary issues, but even though we assume that such testimony would support findings in his favor, we are still faced with the fact that the court in its judgment chose to make findings predicated upon testimony favorable to the plaintiff. Under such circumstances, is it the function of this court to ignore such findings and to make an independent analysis and determination of the issues in controversy? We think the answer is no."

Relative to the limited function of a reviewing court under the instant circumstances, see also *Graver Tank & Mfg. Co., Inc. et al.* v. *Linde Air Products Co.*, 336 U. S. 271 and 339 U. S. 605; *Hazeltine Research, Inc.* v. *Admiral*

Corp., 183 F. 2d 953, and *Weller Mfg. Co.* v. *Wen Products, Inc.*, 231 F. 2d 795.

Thus, in reality the issues here are not merely those of invention and infringement but whether this Court can say that the findings of the District Court on these issues are clearly erroneous. In addition, this Court, as did the District Court, must take into consideration the axiomatic rule that a patent from the fact of issuance is presumed to be valid. *Radio Corp. of America et al.* v. *Radio Engineering Laboratories, Inc.*, 293 U. S. 1, 7, and as this Court stated in *Lewyt Corp.* v. *Health-Mor, Inc. et al.*, 181 F. 2d 855, 857, "* * this presumption is strengthened in a case where, as here, the prior art relied upon to invalidate the patent was considered and rejected by the patent office."

We think that no good purpose could be served in an attempt on our part to analyze and dissect the voluminous exhibits relied upon as prior art. They consist of many patents, none of which were ever reduced to practice so far as we are aware, as well as numerous articles and publications prepared by the patentees and other high-ranking members of the dental profession. An analysis of such art is in a field for experts, not laymen. The District Court heard the explanatory testimony of experts and found that the patents were not anticipated by the prior art. We find no reason to disagree; certainly we cannot say that such a finding is clearly erroneous. In this connection, defendants contend that all the prior art was not cited in the prosecution of the applications which culminated in the granting of the patents in suit. Four publications are included in this category, an article by Grove and Grove, two articles by Stephan and one by Dr. Kesel. A study of these articles reveals nothing which reflects upon the validity of the patents; in fact, we suspect they were not cited by the Examiner because of immateriality.

In addition to the presumption attaching to the grant and the findings of the District Court, there are other criteria which suppost patentable invention. As already noted, none of the prior art was reduced to commercial practice and this in spite of the long-felt want for a dentifrice which would aid in the elimination of tooth decay. The statement of this Court in *Ric-Wil Co.* v. *E. B. Kaiser Co.*, 179 F. 2d 401, 404, appears to be appropriate:

> "The prior art upon which defendant now lavishes its praise was apparently permitted to lie dormant until the exigency, created by a suit for infringement, required its resurrection."

It is true, as defendants point out, that prior art, even though not reduced to practice, may be utilized to anticipate. Even so, however, we think its use for that purpose under existing circumstances is greatly impaired. Also as noted, defendants concede the utility of the product manufactured in accordance with the teachings of the Kesel and Wach patents. Not only were their teachings reduced to practice, but the product enjoyed great commercial success. Some thirty dentifrice manufacturers have been licensed under these patents, including such leaders in the industry as Colgate, Ipana, Pepsodent, Kolynos, Walgreen and Amurol. Another significant factor relative to the prior art is the derogatory appraisement which Dr. Henschel made of it during the course of the proceedings which resulted in the issuance of his patent.

In our view, the most serious question arises from defendants' contention that defendants' alleged infringing products were on the market long before Kesel's disclosure in the Patent Office upon which his claims were allowed. If this contention is sound, it means, of course, that Henschel was entitled to priority over Kesel, which would result in the invalidation of the latter's claims. As already shown, both the Wach and Henschel patents issued

February 20, 1951, while the Kesel patent did not issue until December 16, 1952. The important date on the question of priority, however, is that of disclosure, not that of issuance.

Both Kesel and Wach stem from an original application, Serial No. 721,156, filed January 9, 1947, in the names of Kesel, Wach, O'Donnell and Kirch (referred to as the parent application). Some claims called only for dibasic, others for urea plus dibasic. The Patent Office held that there were claims to more than one species and required the applicants to make an election. As a result, Kesel claimed to be the inventor of the dibasic ammonium phosphate dentifrice, and Wach, the inventor of the combination of such dibasic and urea. Thereupon, separate "continuation-in-part" applications were filed October 1, 1948, in the names of Kesel and Wach individually. Kesel's claims were rejected on the prior art, and they were amended from time to time primarily on the Examiner's holding that the proof of utility was not sufficient. On appeal, the claims were held unpatentable by the Board of Appeals, and Kesel appealed to the District Court. The matter was not pursued in court, however, because on July 7, 1952, Kesel filed a second "continuation-in-part" application, with amended specifications and with some change in the phraseology of the claims. It was upon this third application that the patent finally issued.

The District Court reviewed the facts on the issue of priority and in its opinion stated:

> "In this original application are two broad claims which fully cover the claims finally allowed in the patents: (a) 'A dentifrice comprising as an essential ingredient dibasic ammonium phosphate.' (b) 'A dentifrice comprising urea, and a non-toxic, non-acid salt of ammonia.' In a situation where the later applications refer back and are a continuation of the first

application, the patent dates back to the time the original application was filed."

The Court also stated:

> "Both Kesel and Wach are entitled to priority over Henschel. Kesel was adopted to practice prior to the filing of the application. Wach's formula for dibasic and urea was used by Dr. McElroy, a practicing dentist in Chicago, in January, 1946. The dentifrice was supplied to him and prepared by Dr. Wach. This was prior to Dr. Henschel's application and his use of the combination."

Further, the Court found as a fact that both Kesel and Wach were entitled to priority over Henschel, and specifically (referring to Kesel):

> "The final application of July 7, 1952 was entitled to the filing date of the earlier application as to all common subject matter."

We discern no reason to disagree with the District Court either upon its reasoning or finding relative to the issue of priority, and we approve. It is fortunate that we are not required to solve the puzzling situation arising from the proceedings in the Patent Office. Kesel and Wach (particularly the former) appear to have been engaged in a race with Henschel, the goal of which was to obtain the prior issuance of a patent. As shown, the parent application of Kesel and Wach was filed January 9, 1947, while Henschel's application was filed February 27 of the same year. Wach and Henschel issued on the same date, February 20, 1951, while Kesel did not issue until December 16, 1952. Thus, for the same period of some four or five years, all three applications were under consideration. All traveled a rugged road and met sturdy resistance from the Examiner in view of the prior art, all deprecated the prior art as being useless, and finally, it appears, convinced the Examiner of the soundness of their

contentions on this score. It appears to us that the issue of priority should have been determined in an interference proceeding rather than leaving it to the courts. Obviously, such a determination would have avoided expensive and time-consuming litigation. In this connection plaintiff contends, with some plausibility, that the issuance of the Kesel patent constitutes a recognition by the Patent Office of a prior disclosure and use by Kesel dating back to the time of the filing of the parent application.

We now come to defendants' contention that the claims of the Wach patent are invalid. Much of what we have heretofore said relative to Kesel is pertinent as to Wach and need not be repeated. As the claims (heretofore set forth) disclose, Kesel called for a dentifrice the essential component of which was dibasic ammonium phosphate (called dibasic), while the claims of Wach called for urea in connection with and in addition to the dibasic of Kesel. It must be admitted, we think, that the question is whether the addition of urea to the compound disclosed by Kesel constituted an improvement which may properly be characterized as a patentable invention. Defendants argue that the claims of Wach are directed to a simple mixture of two compounds to secure their normal and expected result, which was well within the competency of any person skilled in the art. This same argument was rejected by the District Court, as is evidenced by the following finding of fact:

> "The addition of urea to dibasic ammonium phosphate in a dentifrice produces a synergistic action, particularly in the fact that the dibasic ammonium phosphate acts immediately and the urea more slowly, or latently."

Defendants in their brief inform us, we think correctly, as to the meaning of "synergistic action." They state that it refers to "compositions containing two or more chem-

ical compounds, particularly in the therapeutic field, that are supposed to convert an aggregation into a combination, just as a claim of 'unexpected and unobvious' results is supposed to do in the mechanical arts." They supply a definition from Webster's New International Dictionary of the English Language, Second Edition, Unabridged, Springfield, Mass., 1947, page 2259, as follows: "Synergism. 1. *Physiol.* Co-operative action of discrete agencies such that the total effect is greater than the sum of the two effects taken independently; * *."

The record clearly refutes defendants' argument that the addition of urea by Wach to the dibasic of Kesel produced nothing more than the normal and expected result, or that the result achieved by mixture of the two chemical elements was nothing more than the totality of the results which would have been produced if the chemicals had been used separately.

In fact, defendants are in a poor position to urge that Wach's combination produced no synergistic action, in view of the representations made to the Patent Office by Dr. Henschel by which he obtained allowance of his claims. On October 10, 1949, the Examiner disallowed claims submitted by Henschel on the basis that "there is no proof that the conjoint use of urea and dibasic ammonium phosphate provides a synergistic effect." In response to this action of the Examiner, Henschel stated: "That this synergistic effect is not an afterthought newly suggested as basis for patentability, but was noted and fully appreciated by the applicant has always appeared of record." In the specification he flatly reported that the use of "diammonium hydrogen phosphate together with urea * * is surprisingly effective. The ammonium salt constituent performs a prompt and quick inhibiting action * * and the urea follows with a slow and enduring protective action for hours after the ammonium salt has been washed out."

And again, in the same response Henschel stated: "Applicant thus teaches the joint use of both ingredients as well as their mutual interactivity. The utility of the combination is amply evidenced by his paper and the statistical evaluation thereof, and the synergistic action clearly appears from his specification and from actual experimental work."

Defendants suggest that they as licensees or assignees of Henschel are not bound by statements made by him to the Examiner in pursuit of his application for a patent. It may be as defendants assert, at any rate we so assume, that Dr. Henschel's representations in the Patent Office cannot now be utilized as an estoppel against them. Even so, we perceive no reason why his representations at that time should be held for naught. He was a qualified expert, perhaps the equal of any who are or have been connected with the case. His representations in the Patent Office were not only consistent with but corroborative of the position taken by Wach both in the Patent Office and in the District Court. More than that, defendant Amm-i-dent has repeatedly advertised that its dentrifrice composed of dibasic ammonium phosphate and carbamide (urea) possessed a "synergistic action" in that "each increased the effectiveness of the other."

Plaintiff contends in any event that the Wach claims are valid even in the absence of proof of "synergistic action," while defendants argue to the contrary. Numerous cases are cited and discussed as bearing upon this argument. There is no occasion, however, to enter this discussion because we are of the view that the finding that "synergistic action" was shown is clearly supported.

Finally we come to the issue of infringement. On this issue the District Court not only made a specific finding of infringement but also made the subsidiary finding, "The Amm-i-dent dentifrices are the equivalent of those

disclosed in the Wach and Kesel patents, and this equivalence has been widely advertised by the defendants Amm-i-dent and Block." As heretofore noted, no question is raised in this court but that Amm-i-dent manufactured and sold by defendants infringes Kesel and, obviously, the decision of the District Court on that issue stands. We are concerned, therefore, only with the issue of infringement as it relates to Wach. A finding of infringement, like one of validity, is controlling unless clearly erroneous. Moreover, a finding of equivalence is a determination of fact which must be accorded the same treatment by a reviewing court. *Graver Tank & Mfg. Co., Inc. et al.* v. *Linde Air Products Co.*, 339 U.S. 605, 609-610; *Ingersoll Milling Mach. Co.* v. *General Motors Corp.*, 207 F. 2d 42, 46.

Defendants' principal contention is that Wach limits his invention to a compound containing 10% urea, while the accused product contains 13%. We agree with the District Court that the claims of Wach, read in the light of his specifications, contain no such limitation. The most that he does is to suggest that the amount of urea should not exceed 10%; otherwise, it would be difficult to mask its taste. Defendants in their attack upon the validity of the patents in suit, in view of the prior art, attach great weight to the ingenuity of those skilled in the art, that is, members of the dental profession. In contrast, however, their defense on the infringement issue, if accepted, would well near obliterate all acumen possessed by the members of that profession. At any rate, it is not discernible that any great skill was required to increase the percent of urea which Wach disclosed as preferable. Even with such changes in percentage in defendants' product, the result was the same, achieved in the same manner, and was the equivalent of Wach.

The decree appealed from is

AFFIRMED.

APPENDIX C.

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Plaintiff,
vs.
BLOCK DRUG CO., AMM-I-DENT, INC., F. W. WOOLWORTH CO., and CHESTER J. HENSCHEL,
Defendants.
Civ. No. 2410.

UNITED STATES DISTRICT COURT

E. D. Illinois.

July 12, 1955.

PLATT, *District Judge.*

The plaintiff, The University of Illinois Foundation, has filed a suit against F. W. Woolworth Co., Amm-i-dent, Inc., and Chester J. Henschel, alleging that the defendants have infringed upon their two patents for "ammoniated" dentifrices. Personal service was obtained only upon F. W. Woolworth Co. The suit was dismissed as to the defendant Henschel. A Stipulation was entered into between the parties whereby this court obtained jurisdiction of Amm-i-dent, Inc. and Block Drug Company.[1]

1. "That the defense of this action is controlled or directed by Block Drug Company and Amm-i-dent, Inc., by whom defendant's attorneys have been retained and from whom defendant's attorneys receive instructions relative to the defense of this suit. All expenses are being paid by Amm-i-dent, Inc., Block Drug Company, although defendant F. W. Woolworth Co. is kept advised of the progress of the litigation and is agreeable to being represented by counsel here appearing on its behalf. Block Drug Company, being Woolworth's supplier with respect to Amm-i-dent

Woolworth has sold Amm-i-dent dentifrices, both in powder and paste form, within this district since the issuance of the plaintiff's patents. The formula for Amm-i-dent Tooth Paste is as follows:

Urea	13.00%
Diammonium phosphate[2]	3.00%
Abrasives	39.79%
Liquid excipient	40.16%
Binder	.28%
Flavor	1.77%
Detergent	2.00%
pH adjusted to 7.0	

Amm-i-dent Tooth Powder consists of:

Urea	22.5%
Diammonium phosphate	5.00%
Abrasive	64.80%
Detergent	.5 %
Flavor	2.2 %
Bentonite	5.0 %

These dentifrices were manufactured by Amm-i-dent, Inc. and distributed by Block Drug Co. as their licensee.

The plaintiff, by virtue of an assignment, is the owner of the Kesel Patent,[3] No. 2622058, hereinafter referred to as Kesel, and the Wach Patent, No. 2542886, hereinafter referred to as Wach. Amm-i-dent, Inc. is the licensee of Patent No. 254218, issued to Chester J. Henschel (formerly defendant in this suit), hereinafter referred to as Henschel.

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dentrifrices, has agreed to indemnify Woolworth against any loss, damage, or expenses in connection with this action." See *Esquire, Inc.* v. *Varga Enterprises, Inc.*, D. C., 81 F. Supp. 306, affirmed on this point 7 Cir., 185 F. 2d 14; Also see 69 C. J. S., Patents, § 339, p. 1071.

2. This is the same as dibasic ammonium phosphate.

3. Added to the complaint by amendment.

Kesel claim 1 reads as follows:

"1. A dentifrice comprising a non-toxic carrier adapted for oral administration and dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being not substantially less than 2% of the composition, and a flavor masking ingredient."

Wach claim 6 provides:

"6. A dentifrice comprising a major portion of a non-toxic, non-sugary carrier adapted for oral administration, containing from 1 to 10 parts by weight of urea and from 1 to 7 parts by weight of a dibasic ammonium phosphate, there being at least 1% by weight of urea and at least 1% by weight of the phosphate present in said dentifrice."

Henschel claims read:

"1. A powdered dentifrice including the following ingredients in substantially the following proportions by weight:

	Parts
Urea	15 to 50
Di-ammonium hydrogen phosphate	7 to 4
Abrasive	71 to 34

"3. A dentifrice having as active ingredients, urea and diammonium hydrogen phosphate, the urea being by weight between 15 and 50 per cent by weight of the dentifrice and the diammonium hydrogen phosphate being 4 and 7 per cent by weight of the dentifrice."

These dentifrices are intended to reduce dental decay.

The cause of dental caries (dental decay) has been studied for a good many years. It has generally been an accepted theory that a bacterium, called lactobacillus acidophilus, is found in the saliva and is associated with decayed teeth. Dr. Robert Kesel began a study of the in-

dividuals whose teeth were decay resistant and those who were not. He graduated from the College of Dentistry of the University of Illinois in 1926, with a degree of D.D.S. and from the University of Illinois Medical School in 1931, receiving an M.S. in Bacteriology. Since 1936 he has been head of the Department of Applied Materia Medica and Therapeutics of the College of Dentistry of the University of Illinois. From this study it was determined that there was an amount of ammonia in the saliva of caries inactive individuals which had the ability to inhibit lactobacilli, and that the amount was greater than normally produced by the breaking down of urea in the saliva. This indicated there was some source of ammonia in the mouth in addition to the salivary urea. Dr. Kesel's method was unusual. As early as 1941 or 1942 he and two of his students, Berry and Orland, all three being caries inactive, placed the incubated saliva of caries active individuals in their mouths. They found that the microorganism in the saliva they placed in their mouths disappeared. Even when sugar was added these organisms disappeared in 24 hours. This indicated there was something in their saliva which overcame this bacteria. They found this to be aerogenes bacteria which were capable of producing ammonia. A great deal of experimental work in vitro (in test tubes) with saliva was performed. The problem was then presented as to how to raise the ammonium content of the saliva of caries active individuals. Dr. Kesel had working with him Drs. Wach, Kirch, and O'Donnell, all of whom were connected with the College of Dentistry of the University of Illinois. They found that alkaline salts of ammonium when added to the saliva stimulated the aerogenes bacteria inhibiting lactobacillus, but that acid salts did not. They selected dibasic ammonium phosphate (hereinafter referred to as dibasic) as the preferred ammonium salt. From time to time in 1944 and 1945 patients with decayed teeth were referred to the group at the University of Illinois

Dental School. It was found, with few exceptions, that patients who were administered dibasic had a lower lactobacillus count after three or four months use.

Sometime before the fall of 1945, Dr. Wach suggested the addition of urea to dibasic. In the fall of 1945 or early winter of 1946 tests were made using the combination of urea and dibasic. Their experimental work disclosed the supporting action between dibasic and urea. In the early part of 1948 in Peoria, Illinois, they began study on school children which lasted for about two years. The tests were made with a combination of dibasic and urea dentifrice.

Dr. Kesel appears to have been the spokesman of the group. He reported the findings to the Chicago Dental Society on February 13, 1946, including the test with dibasic dentifrice on some 55 individuals. This report was awarded the annual prize of the Chicago Dental Society for research investigation. He next read a paper October 9, 1946 at Palm Springs, California on the subject of "Ammonium Production of Oral Cavities and the Use of Ammonium Salts with Control of Dental Caries." In this paper printed in the Journal of Oral Surgery, Dr. Kesel explained the experiments using urea and dibasic. He gave further lectures before Dental Societies and wrote various articles on the experimental work that had been done.

Dr. Chester J. Henschel, a practicing dentist in New York City, delivered a paper in May, 1945 before the Westchester Dental Society and printed in the New York Journal of Dentistry in March, 1946 entitled "Caries Control by Chemical Prophylaxis" in which he submitted a formula containing urea for use in a liquid dentifrice. Dr. Henschel had been doing some work using a dentifrice with a very high urea content but found it irritating.

The defendants maintain:

A. That the plaintiff's patents are invalid for the following reasons:

1. Henschel patent is entitled to priority over the plaintiff's patents.
2. Kesel is invalid on the law of the case.
3. Both of the plaintiff's patents were anticipated by prior art.
4. The plaintiff's patents lack utility.
5. Kesel is invalid on the ground of double patenting or illegal extension of monopoly.
6. Wach lacks evidence of synergism of any such combination of urea and dibasic ammonium phosphate.

B. Defendants do not infringe.

[1-4] There are certain applicable principles of law which must be recognized. A patent once issued is presumed to be valid. As to the defense of invalidity it is said,

> " '[T]he burden of proof to make good the defense' is 'upon the party setting it up' and 'every reasonable doubt should be resolved against him'."

Radio Corporation of America v. *Radio Engineering Laboratories, Inc.*, 293 U. S. 1, 7, 55 S. Ct. 928, 79 L. Ed. 163. The presumption is strengthened where the prior art relied upon to invalidate the patent was considered and rejected by the patent office, but this is not conclusive. *Lewyt Corporation* v. *Health-Mor, Inc.*, 7 Cir., 181 F. 2d 855, 857. It is, therefore, plain that the burden of establishing the invalidity of the plaintiff's patent is upon the defendant. On the other hand the burden of proving infringement by a preponderance of the evidence is upon the plaintiff. *Harries* v. *Air King Products Co., Inc.*, 2 Cir., 183 F. 2d 158; *Kalo Inoculant Co.* v. *Funk Bros. Seed Co.*, 7 Cir., 161 F. 2d 981, reversed on other grounds 333 U. S. 127, 68 S. Ct. 440, 92 L. Ed. 588; 69 C. J. S., Patents, § 326, p. 1001.

[5, 6] The first question with which this court is confronted, is priority of patent rights. This must be determined as a matter of fact. *Sarnes* v. *Morley*, D. C., 56 F. Supp. 735; *Kislyn Corporation* v. *Eastman Kodak Co.*,

D. C., 43 F. Supp. 552. It requires consideration of (1) the dates of the patents, (2) the dates of the applications, (3) the dates of actual reduction to practice, and (4) the dates of conception. *Automatic Weighing Mach. Co.* v. *Pneumatic Scale Corp.*, 1 Cir., 166 F. 288; *Corley* v. *Robinson*, D. C., 3 F. Supp. 176; 69 C. J. S., Patents, § 87, page 383. The dates of the patents are: Henschel February 20, 1951; Wach February 20, 1951; and Kesel December 16, 1952. The dates of application, as shown on the patents are: Henschel February 27, 1947, Wach October 1, 1948, and Kesel July 7, 1952. However, Wach and Kesel both stem from the original application of Kesel, Joseph F. O'Donnell, Ernest R. Kirch, and Wach filed January 9, 1947. It was agreed between this group as shown by the file wrapper, that Wach was the sole inventor of a dentifrice using the combination of dibasic and urea, and that Kesel was the sole inventor of the dibasic dentifrice. After several amendments and narrowing of claims both Wach and Kesel issued on the original application of Kesel, *et al.* In this original application are two broad claims which fully cover the claims finally allowed in the patents: (a) "A dentifrice comprising as an essential ingredient dibasic ammonium phosphate." (b) "A dentifrice comprising urea, and a non-toxic, non acid salt of ammonia."[4] In a situation where the later applications refer back and are a continuation of the first application, the patent dates back to the time the original application was filed.[5]

4. Page 18 of Kesel, et al. file wrapper.

5. The law was codified in the Patent Act of 1953, Sec. 120, Title 35, U. S. C. A. "'[A] continuing application is a development of an applicant's earlier application and which is entitled to the filing date of his earlier application for a constructive reduction to practice of the common embodiment of his invention in the two applications.'" *Philip A. Hunt Co.* v. *Mallinckrodt Chemical Works*, D. C., 72 F. Supp. 865, 872, affirmed 2 Cir., 177 F. 2d 583, 586. This case holds that inasmuch as the first application was rejected for inadequate disclosure, and the invention was in use two years before the second application was filed, there cannot be a continuation of the first application. This case

[7] The defendants lean upon the law applied in the patent office which they claim does not permit Kesel to rely on the filing date of the original application of January, 1947. The Board of Appeals did reject the Kesel claim in May and June of 1952. July 7, 1952 the final application was filed. The Examiner in his discretion[6] granted the patent and did not stand on the theory of the cases[7] cited by the defendants that the claims that were originally made were *res adjudicata*. Kesel did file a suit in equity under R. S. §4915, 35 U. S. C. A. §§ 145, 146, but this was dismissed without hearing. Kesel was entitled to the filing date of his original application. *Overland Motor Co.* v. *Packard Motor Co.*, 274 U. S. 417, 47 S. Ct. 672, 71 L. Ed. 1131; *Keyes Fibre Co.* v. *Chaplin Corp.*, D. C., 97 F. Supp. 605, 609. Also see *American Anode, Inc.* v. *Lee-Tex Rubber Products Corporation*, 7 Cir., 136 F. 2d 581.

Both Kesel and Wach are entitled to priority over Henschel. Kesel was adopted to practice prior to the filing of the application. Wach's formula for dibasic and urea was used by Dr. McElroy, a practicing dentist in Chicago, in January, 1946. The dentifrice was supplied to him and prepared by Dr. Wach. This was prior to Dr. Henschel's application and his use of the combination.[8]

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is distinguishable from the instant case because the original Kesel, et al. application explicitly and adequately discloses both dibasic and urea and dibasic as an invention. See *B. F. Sturtevant Co.* v. *Massachusetts Hair & Felt Co.*, 1 Cir., 122 F. 2d 900, 913.

6. *Minnesota Mining & Manufacturing Co.* v. *Coe*, 79 U. S. App. D. C. 59, 143 F. 2d 12.

7. *In re Becker*, 74 F. 2d 306, 22 C. C. P. A., Patents, 843; *In re Ellis*, 86 F. 2d 412, 24 C. C. P. A., Patents, 759.

8. The facts and circumstances corroborate Dr. Wach's reduction to practice. Dr. Kesel's testimony corroborates Dr. Wach. Also the laboratory notes of Dr. O'Donnell dated January 16, 1946, which were not admitted in evidence by oversight, but referred to by both plaintiff and defendants in their briefs, and hereby considered in evidence by the court. It shows tests of 5% dibasic and 3% urea in vitro. This is corroborated by Dr. Kesel and the laboratory notes.

In addition there is evidence that Dr Wach conceived the combination prior to January 16, 1946. Dr. Henschel attended the meeting in Chicago, Illinois, where Dr. Kesel delivered his paper before the Chicago Dental Society on February 13, 1946. Dr. Kirch, who was on the platform with Dr. Kesel, was approached after the meeting by Dr. Henschel who inquired whether work had been done using urea and dibasic. Dr. Kirch informed him that it had. After this date Dr. Henschel prepared a dentifrice of dibasic and urea and prescribed it for patients. There is no question but what Wach diligently reduced his conception to practice. Under such facts even if Dr. Henschel had reduced his dentifrices to practice prior to Dr. Wach, Dr. Wach was the first inventor. *Marconi Wireless Telegraph Co. of America* v. *United States*, 320 U. S. 1, 34, 63 S. Ct. 1393, 87 L. Ed. 1731; *Scharmann* v. *Kassel*, 179 F. 2d 991, 37 C. C. P. A., Patents, 903; 69 C. J. S., Patents, § 86(b) and cases cited therein.

This brings forward the next defense that the plaintiff's patents were anticipated by prior art. The defendants have cited 13 patents and 41 publications.[9]

Against Kesel the defendants rely principally upon the patents of McCall (1929), Detrie (French 1936, No. 803,-161), Cross (1934), and Janota (1946). McCall and Detrie were cited by the patent office in Kesel, Wach and Henschel. McCall uses less than 1% of ammonium carbonate in a dentifrice to reduce mouth acidity. Detrie used 80 parts of

9. In *United Chromium* v. *International Silver Co.*, D. C., 53 F. 2d 390, 393, modified on other grounds, 2 Cir., 60 F. 2d 913, certiorari denied, 288 U. S. 600, 53 S. Ct. 319, 77 L. Ed. 976, the court there said,

> "But, inasmuch as a chemical action is involved here, analogy does not go a long way, because, while one can predict with confidence in mechanics in some instances, and in some cases where mathematics can be applied, in chemistry one almost entirely fails. In chemistry one cannot anticipate a result. A result may be obtained only by experiment."

ammonium sesqui carbonate in a dentifrice to dissolve salivary tartar and mucin by restoring the alkalinity of the saliva. The defendants claim the Examiner was misled to believe that the ammonium sesqui carbonate in Detrie had an acid reaction. Before the same Examiner in Henschel it is plainly shown that the Examiner knew it had an alkaline reaction.[10] McCall disclosed insufficient amounts of ammonium carbonate to anticipate Kesel. Cross used less than 4.2 of sodium phosphate in a dental preparation. Sodium phosphate may be distinguished from the more stable phosphate, dibasic ammonium phosphate. Sodium phosphate-Monobasic consists of NaH_2PO_4,[11] whereas, the formula for dibasic ammonium phosphate is $(NH_4)\ {}_2HOP_4$. There is also disodium phosphate and trisodium phosphate. No suggestion is made in the patent as to which of these is to be used. Janota speaks of using sodium potassium and ammonium.[12] It also speaks of pyrophosphates. There is nothing definite in these terms which would teach the use of dibasic ammonium phosphate. It must be observed that Kesel taught the inhibition of lactobacillus and the stimulation of the aerogenes bacteria to get a natural production of ammonia to maintain tooth integrity. All of these patents were referred to by the same Examiner in either Kesel, Wach, or Henschel.

The publications relied upon principally as anticipating Kesel are Lichtenstein, Grove and Grove, Kesel, and Stephan. Dr. Edith Lichtenstein published a thesis in 1924 in which she found a relationship between the ammonia content of the saliva and dental caries. The defendants urge that this thesis suggests the introduction of neutralizing salts in the saliva. This court comes to no such con-

10. Pages 12 and 28 of the Henschel file wrapper. See also page 23 original file wrapper of Kesel, et al.

11. Merck's Index (4th Edition) page 481. Monobasic-solution acid to litmus.

12. Lines 9 and 10 second column of Janota patent.

clusion. All Lichtenstein does is to confirm the relationship between the ammonia content in the saliva and immunity from dental caries.

Grove and Grove conducted experiments on immunity and susceptibility to dental caries and published papers on the subject between 1934 and 1942. As early as 1934 Groves' paper emphasized that where the pH of saliva is above 7 there are alkaline ammonium salts present capable of being an immunizing force against caries.[13] Grove and Grove recommended .006% of 1% of ammonium. It was proven that such amount has no effect. The defendants have also relied upon the Kesel paper of 1945 as an anticipation of Kesel. "Deamination of Amino Acids by the Human Oral Flora; Its Role in Dental Caries Immunity." Defendants' Exhibit 4D-20. This was cited, as was Grove, before the same patent examiner. It does not disclose a formula for a dentifrice.

Dr. Stephan *et al.* published an article in February, 1944 on the effect of urea upon lactobacilli.[14] He experimented from .01% to 50% of urea and reported on the pH of placques material in 1943. The defendants claim this is anticipatory as urea breaks down in the mouth to ammonia. The Examiner was familiar with Stephan's work. Nowhere does Stephan suggest the use of urea to stimulate the aerogenes bacteria, nor does he teach the use of dibasic. Dr. John B. Lewis, Director of Research of Amm-i-dent, Inc., recognized that the use of both Kesel and Wach denti-

13. "The Biochemical Aspect of Dental Caries" Vol. 76, Dental Cosmos, Oct. 1934, the pH considered neutral as between alkaline and acid content. (Phenolphthalein indicator.) Defendants' Exhibit 4P—Item 11.

14. Defendants' Exhibit 4P—Item 13. Stephan and Miller. "Effectiveness of Uses and of Synthetic Detergents in reducing Activity of Human Dental Caries." Cited against Kesel, Wach, and Henschel.

frices promoted the growth of an organism which had an inhibitory effect referred to as bacterium lactic aerogenes.[15]

As against Wach the defendants press these patents as anticipatory: Meiser (1934) 9,951,581; Jones (1948) 2,452,-054, (using a priority of 1944). Jones was cited. Meiser was referred to by the same Examiner in Henschel.[16] It is for a fertilizer. It certainly is not analogous art and could not be anticipatory of a dentifrice. See *Copeman Laboratories Co.* v. *General Plastic Corp.*, 7 Cir., 149 F. 2d 962; *General Metals Powder Co.* v. *S. K. Wellman Co.*, 6 Cir., 157 F. 2d 505, certiorari denied 329 U. S. 812, 67 S. Ct. 632, 91 L. Ed. 693; *Nordberg Mfg. Co.* v. *Woolery Machine Co.*, 7 Cir., 79 F. 2d 685. See also 69 C. J. S., Patents, § 23, p. 202, and cases cited therein at note 83. For the same reason Jones may be equally discarded as it pertains to a fire extinguisher.

The publication upon which main reliance is placed to anticipate Wach is Stephan and Grove & Grove. The 1944 publication of Stephan was cited and discarded. The Examiner was familiar with all of Stephan's publications as shown by the file wrapper of Kesel, Wach, and Henschel. It has been discussed as to its anticipatory effect upon Kesel. For the same reasons it is not anticipatory of Wach. Dr. Henschel cited Grove & Grove in his paper of 1945. It had not suggested to him the use of dibasic.

[8] The defendants next insist that the plaintiff has failed to show that either Kesel or Wach have utility.[17] Neither of these patents claim to be a cure-all for tooth

15. Page 37 Henschel file wrapper at page 42.

16. *Artmoore* v. *Dayless Mfg. Co., Inc.*, 7 Cir., 208 F. 2d 1, 4. "It has been held • • • that it is as reasonable to conclude that a prior art patent not cited was considered and cast aside because not pertinent, as to conclude that it was inadvertently overlooked."

17. This is refuted in Henschel. "The soluble salt as expected acts immediately whereas urea is slow and prolonged." Henschel file wrapper at page 17.

decay but both show a progress in solving a health problem. Kesel experimented with dibasic dentifrice on some 55 individuals who were referred to him. With a few exceptions these patients were aided by the use of dibasic dental compound. Defendants insist that dibasic has no effect on lactobacillus and it is most doubtful that lactobacillus has any relationship with dental caries. This is a strange argument inasmuch as Henschel also teaches the inhibition of lactobacillus.

In 1948, the University of Illinois appropriated $50,000.00 to study the effect of ammoniated dentifrices on the teeth of children in Peoria and Aurora.[18] The dentifrice used in the Peoria study contained 3% urea and 5% dibasic. The clinical survey was conducted by the Department of Public Health, State of Illinois. Statistics were tabulated by reputable statisticians employed by this Department. The results showed a 16 to 17% reduction in caries among children using the ammoniated dentifrice. The defendants have attacked the validity of these statistics and the method used, but this evidence is not convincing. The defendants have offered ex parte experiments to show the non utility of Wach. Such experiments have little weight.[19] If partial success was obtained, and this was certainly proven by plaintiff, it is sufficient evidence of utility. *Emery Industries, Inc.* v. *Schumann*, 7 Cir., 111 F. 2d 209.

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18. No analysis on Aurora.

19. *In re Donner* v. *Walgreen Co.*, 7 Cir., 44 F. 2d 637, 642, Judge Lindley, "Defendant introduced the testimony of certain experts who made experiments ex parte. Unfortunately the strict teachings of the formulae and the Donner Patent were not followed, and there is little to enlighten the court, therefore, in the testimony as to the same. The courts place little weight on ex parte demonstrations in any case, but especially is this true with regard to experiments with chemicals. *Kuehmsted* v. *Farbenfabriken Co.*, 7 Cir., 179 F. 701."

Cross Examination of Lois C. Lillick, B.S. M.A. M.D. and Ph.D. in bacteriology, plainly illustrates the unreliability of ex parte experiments.

[9] The defendants argue that since Kesel issued after Wach there is double patenting or the illegal extension of monopoly. Where, as here, there are two separate inventors even if the two patents were assigned to the plaintiff there is not double patenting. *Federal Telephone & Radio Corp.* v. *Associated Tel. & Tel. Co.*, D. C., 99 F. Supp. 535; *Waterbury Buckle Co.* v. *G. E. Prentice Mfg. Co.*, D. C., 294 F. 930.

[10] The defendants stress that Wach consists of a combination of two old elements, dibasic and urea, and that it is invalid because there is no evidence that these elements have cooperating effect in the mouth to merit invention. First, it is questionable whether synergism must be proved to obtain a patent on such a chemical compound. Our Supreme Court indicated this in *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147, 152, 71 S. Ct. 127, 130, 95 L. Ed. 162.

> "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable. Elements may, of course, especially in chemistry or electronics, take on some new quality or function from being brought into concert, but this is not a usual result of uniting elements old in mechanics."

Also see *Diversey Corporation* v. *Mertz*, D. C., 13 F. Supp. 410. But the evidence here discloses that there is synergistic action.[20] Both Henschel and Wach[21] indicated that dibasic acts immediately and urea latently.

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20. At page 35 of Henschel file wrapper. "Submission of detailed laboratory reports on this point would seem to be superfluous, particularly since the synergistic effect was subsequently confirmed by later workers in art, see page 100 of Kesel's report, Vol. 33, No. 2, compare Line E of Table V and Line D of Table IX, with Line D of Table XIII."

21. Dr. Karshan attempted to discredit Wach's finding of synergism shown in the Wach Tables by giving his opinion that there was no synergism at 4 hours, which he claimed is the closest

Arnold J. Singer, D.D.S., employed by Block Drug as Director of Research in their laboratories stated under oath:

> "Much less activity exists with lower concentrations of urea. A solution containing 5% diammonium hydrogen phosphate and 3% urea has only slightly more activity than diammonium hydrogen phosphate alone and the pH of the tooth returns to its normal level within 20 to 40 minutes whereas the high urea concentration keeps the pH elevated for more than 2 hours." (Henschel file wrapper at page 110.)

Dr. Singer here admits there is some synergism in Wach and more so in Henschel or Amm-i-dent. Dr. Lewis also found synergistic action in the use of 4% urea and 1% dibasic. (Page 41 of Henschel file wrapper.) This was within the Wach claim.

[11] This court concludes there is invention and utility in the plaintiff's patents. If there were doubt, the plaintiff has shown commercial success. Licenses were issued by the plaintiff to Colgate, Pepsodent, the manufacturers of Ipana, Dr. Lyon's, Kolynos, Walgreen's, Rexall, and McKesson and Robbins. Commercial success is evidence of utility and invention. See on invention—*Smith* v. *Hall*, 301 U. S. 216, 233, 57 S. Ct. 711, 81 L. Ed. 1049. On Utility—*Flinkote Co.* v. *National Asbestos Mfg. Co.*, 3 Cir., 52 F. 2d 719, 721.

[12] The final proposition is then presented. Does Amm-i-dent infringe Wach and Kesel? The issue of infringement is a question of fact. *Faulkner* v. *Gibbs*, 9 Cir., 170 F. 2d 34, 37, affirmed 338 U. S. 267, 70 S. Ct. 25, 94 L. Ed. 62. The Wach claim covers the defendants' dentifrice like a blanket. The defendants argue that Wach

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to conditions in the mouth. He admitted that he personally had not made lactic acid determinations in saliva. This is a different situation from *Hoover* v. *Eckerd's Cut Rate Medicine Co., Inc.*, D. C., 53 F. 2d 215, 217, affirmed 3 Cir., 63 F. 2d 813, 814.

calling for 1 to 10 parts by weight of urea and from 1 to 7 parts by weight of ammonia should be read as limiting the claim to a formula of not more than 10% of urea. The use of the words "at least 1% by weight of urea and at least 1% by weight of the phosphate present in the dentifrice" would have to be ignored to accomplish the defendants' aim. It is clear that Wach claims 1 to 10 parts by weight of urea in proportion to 1 to 7 parts by weight of dibasic. The defendants use 4⅓ to 4½ parts by weight of urea to dibasic which is plainly within the claim of Wach.

[13] The defendants further contend that the specifications must be read into the Wach claim to refute the use of over 10% urea. A patentee is limited by the express terms of his claims. Resort to the specifications to narrow or enlarge a claim may not be done unless the claim is ambiguous. *Graver Tank & Mfg. Co., Inc.* v. *Linde Air Products Co.*, 339 U. S. 605, 70 S. Ct. 854, 94 L. Ed. 1097. The Wach claim is not ambiguous.

In any event Wach does not disclaim in his specifications the use of large percentages of urea. Wach, Col. 6, suggests a preferred formula for a mouth rinse and a tooth powder. In both of these he was speaking of 5 parts to 3 parts by weight. In the same column Wach states:

> "The amount of urea, however, should not exceed substantially the amount of the ammonium compound, and the amount of the ammonium compound should not be substantially over three times the amount of the urea where the synergistic effect is desired. * * * Obviously if a large proportion of dentifrice is used, the percentage of the urea and ammonium compound may be reduced. If the amount of urea is made too great, however, it is difficult to mask its taste. It is, therefore, *preferred* that the amount of urea should not exceed 10%. * * * The proportion of ammonium phosphate should not normally be above 6 to 7%. * * * In any event the ammonium compound and the urea are used in therapeutic concentrations in the dentifrice

that are sufficient in a normal dentifrice dosage to provide a concentration in the saliva of the mouth that will be inhibitory to the production of the Lactobacillus Acidophilus." (Emphasis supplied.)

Clearly defendants have strained and failed to find in these specifications a disclaimer of more than 10% urea, although it does state the 5 and 3 proportion is preferred.

Intermingled with other arguments in defendants' brief and appendix of 290 pages is the contention that Amm-i-dent is a high urea dentifrice and should not be accused of infringement. This contention was exploded by Dr. Henschel. He said,

> "I would like to see a stop to the phrase 'high' urea right here and now. Just because it is almost meaningless. * * *
>
> "[T]he human body can easily tolerate up to 5% of urea all over the body, and the mouth is no different. * * *
>
> "So that it is not a question of high urea. It is not high urea. The so-called high urea formula is a pretty low urea when it is actually used. * * *
>
> "You see, if you analyze the material which is presented to you, you will see that Dr. Kesel's published work was with using concentrations which were quite similar, if not higher, than my percentages. They are not low. They are higher if anything."[22]

[14] The defendants insist that the plaintiff is estopped to claim infringement of Wach because the claims were contracted as a result of the Jones and Meiser patents. These patents have been discussed and discredited as prior art. Wach originally had a claim which read:

> "A dentifrice comprising from 1 to 7 parts of dibasic ammonium phosphate, 1 to 10 parts of urea and an inert non-sugary carrier adapted for oral administration." Page 25 of Wach file wrapper.

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22. Defendants' Exhibit 4P, item 34, page 79.

This claim in its final form reads as claim 6 and is sufficiently broad as amended to cover Amm-i-dent.[23] A fair and reasonable interpretation of the Wach claim covers Amm-i-dent. I find nothing in the Wach file wrapper where Wach was estopped by any arguments made by counsel as against Amm-i-dent.[24]

The defendants have infringed Kesel. It claims:

> "A dentifrice comprising a nontoxic carrier * * * and dibasic ammonium phosphate in proportion to provide under conditions of use in the mouth a concentration in the saliva sufficient to inhibit lactobacilli and being no substantially less than 2% of the composition and a flavor masking ingredient."

Another claim expressly asserts 2 to 5% dibasic. Amm-i-dent contains 3% and 5% dibasic. Amm-i-dent is manufactured under Henschel. Henschel's purpose is expressed in his patent:

> "It is among the objects of the invention to provide a dentifrice which promptly and efficaciously inhibits the action of the Lactobacillus, * * * and which dentifrice performs various other functions looked for in such commodity and has no toxic action and no objectionable taste."

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23. *Hubble* v. *United States*, 179 U. S. 77, at page 90, 21 S. Ct. 24, at page 25, 45 L. Ed. 95, the court said: "It is quite true, that, where the differences between the claim made and as allowed consist of mere changes of expression, having substantially the same meaning, such changes, made to meet the views of the examiners, ought not to be permitted to defeat a meritorious claimant. While not allowed to revive a rejected claim by a broad construction of the claim allowed, yet the patentee is entitled to a fair construction of the terms of his claim as actually granted." See *New York Scaffolding Co.* v. *Whitney*, 8 Cir., 224 F. 452. *Hutzler Bros. Co.* v. *Sales Affiliated, Inc.*, 4 Cir., 164 F. 2d 260, 267; *Hunt* v. *Armour & Co.*, 7 Cir., 185 F. 2d 722, 727.

24. "[I]t is well settled that mere arguments of an applicant for a patent have no bearing on that question; * * *" (Limiting the scope of the claim.) *York Ice Machinery Corporation* v. *L & K Ice Corporation*, D. C., 6 F. Supp. 544, 546.

It is clear that both are ammoniated dentifrices to reduce tooth decay by inhibiting lactobacilli. Defendants argue that Kesel does not inhibit lactobacilli and could not be infringed. The evidence corroborates Kesel. Dr. Arnold J. Singer and Dr. John B. Lewis in their affidavits[25] in the Henschel file wrapper, and Dr. Henschel in his patent verify that dibasic does inhibit lactobacilli. Dr. Murray J. Rosenthal, Director of Research of Block Drug Company, in his experiments made the same finding. The adding of urea in Amm-i-dent does not radically change its operation and character to void infringement. *Haynes Stellite Co.* v. *Chesterfield,* 6 Cir., 22 F. 2d 635; *A. S. Boyle Co.* v. *Siegel Hardware & Paint Co.,* D. C., 26 F. Supp. 217, 226; *Drumhead Co. of America* v. *Hammond,* D. C., 18 F. Supp. 734, affirmed 3 Cir., 89 F. 2d 241; *Diversey Corporation* v. *Mertz,* D. C., 13 F. Supp. 410; *I. F. Laucks, Inc.* v. *Kaseno Products Co.,* D. C., 59 F. 2d 811, reversed in part on other grounds, *Chas. H. Lilly Co.* v. *I. F. Laucks, Inc.,* 9 Cir., 68 F. 2d 175, certiorari denied *I. F. Laucks, Inc.* v. *Chas. H. Lilly Co.,* first case, 293 U. S. 573, 55 S. Ct. 84, 79 L. Ed. 671, reversed in part on other grounds, *Chas. H. Lilly Co.* v. *I. F. Laucks, Inc.,* 9 Cir., 68 F. 2d 190, certiorari denied *I. F. Laucks, Inc.* v. *Chas. H. Lilly Co.,* second case, 293 U. S. 573, 55 S. Ct. 84, 79 L. Ed. 671. The defendants cite *American Chemical Paint Co.* v. *Firestone Steel Products Co.,* 6 Cir., 117 F. 2d 927, but in that case the elements added were clearly shown to result in a different compound.

There is additional evidence of infringement. The "Reader's Digest", February, 1949 issue, carried a condensed article from "Better Homes & Gardens." The title was "New Brushoff for Dental Decay." It extols the value of the use of ammoniated dentifrice. In a footnote it identified "Amurol" as an ammoniated tooth powder accepted by American Dental Association and manufactured

25. Dr. Lewis's affidavit p. 37 and Dr. Singer's affidavit p. 101.

under license of the University of Illinois Foundation. Amm-i-dent was then advertised to gain the benefit of this publicity, by direct reference to the "Reader's Digest" article. It was stated in advertisements "Amm-i-dent contains carbamide (synthetic urea) and dibasic ammonia phosphate. Amm-i-dent cuts down Lactobacillus Acidophilus, a major cause of tooth decay. Amm-i-dent is pleasantly flavored." Later advertisements[26] were worded: "Amm-i-dent—The Ammoniated Tooth Paste." "Amm-i-dent Reduces Tooth Decay." Defendants were obviously commending Amm-i-dent as an ammoniated dentifrice functioning the same as Wach and Kesel. This manifested infringement. *Wheatley* v. *Rex-Hide, Inc.*, 7 Cir., 102 F. 2d 940, 942. *Gibbs* v. *Triumph Trap Co., Inc.*, 2 Cir., 26 F. 2d 312, 314.

[15] The patent office may have made a mistake in not having an interference hearing. So far as this court is concerned it would have avoided this litigation. The plaintiff did claim Amm-i-dent infringed.[27] However, in no event is the lack of an interference hearing conclusive on non-infringement. *Herman* v. *Youngstown Car Mfg. Co.*, 6 Cir., 191 F. 579, 586; *Ashley* v. *Weeks-Numan Co.*, 2 Cir., 220 F. 899, 903. Also see *Frick Co.* v. *Lindsay*, 4 Cir., 27 F. 2d 59, 63; *West* v. *Premier Register Table Co.*, 1 Cir., 27 F. 2d 653, 656.

[16, 17] The court, therefore, concludes that the plaintiff's patents are valid and have been infringed, but the plaintiff is not entitled to treble damages. Since defendants obtained an assignment of Henschel and acted upon

26. Plaintiff's Exhibits 23, 25, 35, 56, and 58 were published after February 20, 1951 (date of Wach patent) and Plaintiff's Exhibits 19, 70, and 71 were before. Later advertisements did not refute inhibition of lactobacilli.

27. Wach file wrapper page 121.

the advice of counsel, the defendants did not willfully and wantonly infringe. *Artmoore* v. *Dayless Mfg. Co., Inc.*, 7 Cir., 208 F. 2d 1, certiorari denied 347 U. S. 920, 74 S. Ct. 518, 98 L. Ed. 1075.

Plaintiff may submit findings of fact, conclusions of law, and order in conformance with the views expressed herein.

APPENDIX D.

IN THE UNITED STATES DISTRICT COURT,

Eastern District of Illinois,

Danville, Vermillion County.

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Plaintiff,
vs.
BLOCK DRUG CO., AMM-I-DENT, INC., and F. W. WOOLWORTH CO.,
Defendants.

Civil Action No. 2410.

Before the Honorable Casper Platt, Judge of the District Court.

DECREE.

This cause having been considered by this Court upon the pleadings and evidence presented on trial and upon briefs by counsel for the parties and upon the findings of fact and conclusions of law entered this day in accordance with the opinion filed in this Court July 13, 1955, IT IS ORDERED, ADJUDGED AND DECREED:

(1) That Letters Patent of the United States No. 2,622,058, issued December 16, 1952, is valid; that Letters Patent of the United States No. 2,542,886, issued February 20, 1951, is valid; and that plaintiff, The University of Illinois Foundation, has been the lawful owner of the entire right, title and interest in and to each of said Letters Patent and the invention thereof ever since its date of issue.

(2) That defendants, Block Drug Co., Amm-i-dent, Inc., and F. W. Woolworth Co., have infringed Letters Patent No. 2,622,058 by making and selling products covered thereby and have infringed said Letters Patent No. 2,542,886 by making and selling products covered by claims 2, 3, 5, 6 and 8 thereof.

(3) That a writ of injunction issue out of and under the seal of this Court directed to the said defendants, Block Drug Co., Amm-i-dent, Inc., and F. W. Woolworth Co., their officers, agents, attorneys, employees, associates and privies, enjoining and restricting them and each of them from directly or indirectly infringing Letters Patent No. 2,622,058 and Letters Patent No. 2,542,886, and from offering or advertising so to do, and from aiding or abetting or in any way contributing to the infringement of any of said claims.

(4) That the plaintiff recover from the defendants, Block Drug Co., Amm-i-dent, Inc., and F. W. Woolworth Co., for defendants' infringement of Letters Patent No. 2,622,058 and Letters Patent No. 2,542,886 since the dates of their respective issuance, damages according to law.

(5) That the plaintiff recover from the defendants, Block Drug Co., Amm-i-dent, Inc., and F. W. Woolworth Co., its costs and disbursements in this suit to be taxed by the clerk.

/s/ CASPER PLATT,
Judge.

Dated: Aug. 4, 1955.

Office - Supreme Court, U.S.
FILED
JUN 4 1957
JOHN T. FEY, Clerk

IN THE

Supreme Court of the United States

OCTOBER TERM, 1956.

No. 1007

BLOCK DRUG CO., AMM-I-DENT, INC., AND F. W. WOOLWORTH CO.,
Petitioners,

vs.

THE UNIVERSITY OF ILLINOIS FOUNDATION,
Respondent.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

ANSWER TO PETITION FOR CERTIORARI.

CHARLES J. MERRIAM,
141 W. Jackson Blvd.,
Chicago 4, Illinois,

JOHN REX ALLEN,
20 W. Wacker Drive,
Chicago 6, Illinois,
Attorneys for Respondent.

ROBERT V. CONNERS,
ROBERT F. MONAGHAN,
RONALD J. ADAMS,
Of Counsel.

THE LAKESIDE PRESS, R. R. DONNELLEY & SONS COMPANY, CHICAGO

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THE UNIVERSITY OF ILLINOIS FOUNDATION,

Respondent.

ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT.

ANSWER TO PETITION FOR CERTIORARI.

STATEMENT.

Petitioners Seek a Trial De Novo.

With respect to this Petition for a Writ of Certiorari and the usual grounds upon which to base the granting of the writ, United States Supreme Court Rule 38 (5) (b) is applicable and it states:

> "(b) Where a circuit court of appeals has rendered a decision in conflict with the decision of another circuit court of appeals on the same matter; or has decided an important question of local law in a way probably in conflict with applicable local decisions;

> or has decided an important question of federal law which has not been, but should be, settled by this court; or has decided a federal question in a way probably in conflict with applicable decisions of this court; or has so far departed from the accepted and usual course of judicial proceedings, or so far sanctioned such a departure by a lower court, as to call for an exercise of this court's power of supervision."

The three questions purportedly raised by the petition are not within the rule. Petitioners are again attempting as they did in the Court of Appeals, to seek a trial *de novo*.

They did not in the Court of Appeals attack any specific finding of the District Court. They do not do so now. (Pet. Brief p. 32.)

The invention of the ammoniated dentifrice was found by both courts below (as well as the Patent Office) to be a considerable advance in its field. It did not remove the problem of dental cavities, but it did help.

Every major dentifrice manufacturer except the Petitioners Block and Amm-I-Dent (which between them make and distribute Amm-I-Dent tooth paste and powder) took licenses under the patents and paid royalties, even long before the patents issued. (Pet. Brief p. 56.)

As both courts found, Amm-I-Dent and Block prior to the time the patents issued, made all of the claims in the Patent Office which they here attack, and attempted to give the public the impression that they were making the same dentifrice as the University of Illinois Foundation licensees.

When they were sued for infringement, Amm-I-Dent and Block reversed their field and now seek to say not only that the statements which they made in their advertising and under oath to the Patent Office were untrue, but that the courts below should not have paid any attention to these statements because of a "public interest".

The case was an extremely involved one. The trial was extended. There were more than 1200 pages of testimony and almost as extensive an amount of depositions. There were scores of technical documents offered. The files of the patents alone are several hundred pages in extent.

As both courts below have stated, there was conflicting testimony on every contested point. On every such point both courts found for the plaintiff and against the Petitioners. These findings of fact included the following (R. 1142):

> "12. There is invention and utility in each of the plaintiffs' patents. If there were any doubt on this subject, the plaintiff has shown commercial success.
>
> "14. The addition of urea to dibasic ammonium phosphate in a dentifrice produces a synergistic action, particularly in the fact that the dibasic ammonium phosphate acts immediately and the urea more slowly, or latently.
>
> "15. All claims of the Kesel patent are infringed by both the Amm-i-dent tooth paste and the Amm-i-dent tooth powder. Claims 2, 3 and 6 of the Wach patent are infringed by the Amm-i-dent paste and claims 5 and 8 by the Amm-i-dent powder.
>
> "16. The Wach claims which call for 1 to 10 parts by weight of urea and from 1 to 7 parts by weight of ammonium salt do not limit the formula to 10% or less of urea.
>
> "17. There is nothing in the file history or the specification of the Wach patent which would require the limitation of his claims to products containing not over 10% of urea.
>
> "18. Defendants' dentifrice does inhibit the growth of lactobacilli. The addition of urea in Amm-i-dent does not radically change its operation and character to avoid infringement of the Kesel patent.
>
> "19. The Amm-i-dent dentifrices are the equivalent of those disclosed in the Wach and Kesel patents, and this equivalence has been widely advertised by the defendants Amm-i-dent and Block."

I.

Defendants' First Point.

The weakness of the Petition for Certiorari is best illustrated by point 1. Defendants attempt to make this Court believe that the Circuit Court of Appeals in some manner deviated from the decision of this Court in *Great Atlantic and Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147.

That decision is not even referred to by the Court of Appeals nor was the application of that case an issue before it.

What petitioners rely on in their brief at page 12 is a mere speculation of the *District Court* which then passed on the factual issues presented.

Both the District Court and the Court of Appeals expressly stated that there was no need to go into the feigned issue attempted here to be presented under the *facts* of the present case. They did not pass upon the point. (Pet. Brief p. 55 and p. 40.)

Therefore, so far as the petition is concerned the question is entirely moot. Even if this Court approved the argument of petitioners on this issue in its entirety, it would in no way affect the decision below.

It is interesting to note that the two sentences petitioners quote (Brief p. 10) from the *A & P* case and upon which they so strongly rely, conveniently stop short of the more important concluding sentence of that paragraph of the opinion. When all *three* sentences are read *together*, the weakness of petitioners' argument *in this case* is fully unmasked.

These sentences of that opinion (340 U. S. 147) are found on page 152 and, fully quoted, read as follows:

> "The conjunction or concert of known elements must contribute something; only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable. Elements may, of course, especially in chemistry or electronics, take on some new quality or function from being brought into concert, but this is not a usual result of uniting elements old in mechanics. *This case is wanting in any unusual or surprising consequences from the unification of the elements here concerned, and there is nothing to indicate that the lower courts scrutinized the claims in the light of this rather severe test.* (Emphasis supplied.)"

The first *two* sentences quoted by petitioners take on quite a different meaning when read with the concluding sentence. This is particularly so when measured with the *facts* in the case at bar where the issue was raised and the claims carefully scrutinized.

Both courts found in fact that there was synergism, and the petitioners are now really seeking to attack in this Court concurrent findings of fact of both courts below (as well as the Patent Office) that urea and dibasic ammonium phosphate in combination in a dentifrice do things which could not have been expected from a knowledge of their individual characteristics and which in fact exceeded the sum of what each could do alone.

What a chemical will do by itself may or may not be what it will do in the presence of another active chemical. Whether it could have been expected that urea would act on the teeth and the fluids of the mouth, in the presence of dibasic ammonium phosphate even in the same manner in which it operated by itself is certainly problematical. The same is true of the dibasic ammonium phosphate.

The Patent Office found that the action of urea and

ammonium phosphate in each other's presence not only did what possibly might have been expected, but went beyond it. Petitioners Block and Amm-I-Dent supplied affidavits to the Patent Office in their Henschel application in which they swore that urea and dibasic ammonium phosphate produced synergistic action and received a patent as a result thereof. (See R. 159 as to their control of this application.) They circularized the trade with arguments to that effect. (See PX 77. A copy is attached as Appendix A to this brief.)

Respondent presented proof to the Patent Office of its synergistic action and it was accepted as such proof. (Pet. Brief p. 56.)

The District Court and the Court of Appeals both found, as a matter of fact, that such synergism did occur.

Petitioners seek to have this Court re-examine this extensive and highly technical record, which includes conflicting documentary and oral evidence, and ask it to upset the factual decisions of the Patent Office and the two lower courts on this point.

II.

Petitioners Have Not Properly Stated the Facts on This Point. The Original Kesel Application Was Expanded in 1952 But It Was Not Altered as to Scope Except by a Voluntary Disclaimer.

Petitioners' second ground charges the Courts below with creating a new and dangerous concept. They argue that Kesel obtained the benefit of a filing date of an earlier patent application which did not contain a disclosure necessary for patentability. This is not the true set of facts. The fact is that the **only** differences between the two applications were the following:

1. The later application disclaimed the area between 1 and 2% of dibasic ammonium phosphate.

2. The later application included a great deal more proof as to the utility of the combinations originally set forth.

The original Kesel application contained a disclosure of a dentifrice having 5% of dibasic ammonium phosphate. It also had claims to the use of any other alkaline ammonium salt, and it stated that the amounts of these salts normally were between 1 and 7%.

The question is one of fact as to whether the latest Kesel application contained any new matter as compared to the first two applications.

The file of the first Kesel application shows the attention of the Patent Office was called to the infringement by the Amm-I-Dent people (then being handled by Henschel). The Patent Office was therefore fully aware that the dentifrices were in public use.

Furthermore, throughout the application of Kesel constant reference was made to the licensees and what they were doing. Thus, the Patent Office itself knowingly passed upon the question of whether there was new matter which would be met by this prior public use.

Likewise, the matter was passed upon by both the District Court and the Court of Appeals. Counsel for petitioners, on page 16, quote from the Opinion of the Court of Appeals to make it appear that the finding of that court was different than it was. While the Court of Appeals thought this was a serious question, it went on to consider the point and judged against the petitioners.

Petitioners have not printed the succession of Kesel applications so that the court, if it goes into this point, will have to go into the physical exhibits and study them. The fact that petitioners hope to get somewhere on this

point by confusion, rather than by the facts, is shown by the fact that they nowhere make any references to the applications themselves.

We do not believe that it is within the province either of the Petition for Certiorari or the Reply to go into the complicated facts which are back of this point. Nevertheless, we shall do the best we can to set forth what the real facts are.

In the original Wach application there was a claim 11 calling for "a dentifrice comprising as an essential ingredient dibasic ammonium phosphate." That claim will be found in defendants' appendix to the record in the Court of Appeals, defendants' exhibit A, p. 18.

When the application was split because of a division of the inventions between inventors (a proper move and one which is not contested by the petitioners), a divisional application was filed in Kesel's name on the dibasic ammonium phosphate invention on Oct. 1, 1948. No new disclosure was added in this case and no one contests its propriety.

In that case, which is DX-B (nowhere printed), claims 4 and 5 were as follows:

> "4. A dentifrice comprising as an essential ingredient from 1 to 7% of a non-toxic, nonacid salt of ammonia."
>
> "5. A dentifrice as set forth in claim 4 in which the salt of ammonia is dibasic ammonium phosphate."

These claims, modified slightly and renumbered 13 and 14, were rejected and the rejection upheld on appeal on the ground that there was not *conclusive proof* that there was a real difference between the .006% of ammonium hydroxide shown by the Grove reference and the 1 to 7% dibasic ammonium phosphate claimed by Kesel.

Petitioners' statements on page 18 of the petition are

clearly misleading. The Patent office finding that the dentifrice had utility as a dentifrice, did not find that the proportions claimed were critical—a necessary element for patentability, proof of which was supplied in the continuation in part application. The decision of the Patent office Board of Appeals is reported in 103 USPQ 103.

Under the rules of the Patent Office once a case has been appealed it is not permissible to submit new evidence and therefore the only thing possible is to file a new case in which the new evidence can be incorporated. The Patent Office puts no penalty on so doing providing that no "new matter" is added. The Patent Office is extremely zealous to see that no such new matter is added.

As was said in *Helms Products, Inc.*, v. *Lake Shore Mfg. Co., Inc.*, 227 F. 2d 677 (CA 7) the decision of the Patent Office on new matter is extremely persuasive because the Patent Office "is constantly determining and defining what is or what is not new matter."

Therefore, much new *evidence*, but no new matter was added in the third application. However, in view of the fact that some of the tests showed that the dibasic ammonium phosphate in some cases was not clearly effective below 2%, a *disclaimer* was made of the proportions between 1 and 2%.

The applicant stated at page 57 of defendants' exhibit C (which is on page 97 of defendants' appendix to the record on appeal):

> "Actually, we may have disclaimed a portion of the operable range by restricting our claims as amended."

Thus what Kesel did was to say that "I still think that dibasic ammonium phosphate will work down to 1% for most people, but in order to be conservative I am going to disclaim the part between 1% and 2%."

This disclaimer does not make the part disclaimed a reference against the rest of the claim. *Helene Curtis Industries, Inc.* v. *Sales Affiliates, Inc.*, 233 F. 2d 148 (CA 2) at 152, 154. See also *United Chromium, Inc.* v. *International Silver Co.*, 60 F. 2d 913 (CA 2).

Neither petitioners nor the respondent ever used the area between 1 and 2%. No one else does. There was no prior art in that range.

When petitioners say that there was public use of this area they do not speak truthfully. All licensees use and have always used 5% dibasic ammonium phosphate—exactly as taught in the *original* case. Amm-i-dent contains and has always contained 5% in the powder and 3% in the paste.

Intervening rights cannot be created by narrowing the claims. *Wire Tie Machine Co.* v. *Pacific Box Corporation*, 102 F. 2d 543 (CA 9) at 558-560. If respondent had expanded the claim so that whereas there had previously been a minimum of 2% and he had stretched this to 1%, and the defendants had been using that particular range, there might be something to argue about. Respondent did not expand and petitioners did not use the range disclaimed. If they had there would have been no lawsuit on the Kesel patent.

The lower courts' rulings have not, as petitioners attempt to show, created any new or dangerous concept. The rulings below simply gave factual approval to a disclaimed portion of the first application and to the addition of greater proof of utility.

This issue has been met, considered and decided upon by three different tribunals—the Patent Office, the District Court and the Court of Appeals—all contrary to petitioners' views.

III.

A.

Petitioner's Third Question—The Patentability of Proportions—Like the First Two Points, Has No Basis Factually.

Petitioner's third question alleged—"The Patentability of Proportions" (Pet. Brief p. 19)—as a ground for the issuance of the writ falls far short of the scope of U. S. S. C., Rule 38(5)(b).

For these reasons alone, petitioners' third question should be rejected and the petition denied.

Despite the above, petitioners' argument on the patentability of proportions has no foundation in fact.

Petitioners have divided point 3 into two totally unconnected subjects. Neither of them has any basis in the present record.

Point A is the alleged claim that Kesel merely found by routine experiment which proportions were best for his purposes. The facts are:

A. No one prior to Kesel used *any* dibasic ammonium phosphate in a dentifrice in *any* proportion.

B. No one prior to Kesel used *any* ammonium salt in a dentifrice in *any* proportion.

C. The only use of an ammonium compound (not a salt) at all was that of ammonium hydroxide, and that was taught in tiny amounts of .006% by Grove. The testimony of Kesel, the showings in the Patent Office both by Kesel and by petitioners, the publication of defendants' expert Dr. Karshan, all showed the use of .006% of ammonium hydroxide accelerated rather than retarded the growth of lactobacilli.

What Kesel did was really extraordinary.

It was well known that any dentifrice put in the mouth is washed out in a matter of a few minutes and therefore could not be expected to have any continuing or lasting effect. Kesel, entirely independently of anyone else, had the theory that certain bacteria in the mouth, particularly those known as *aerogenes*, might be stimulated by a temporary application of sufficient alkaline ammonium salt that their activity would be stepped up and that if it were stepped up they might control the lactobacilli in the mouth which do the damage to the teeth and that perhaps this control might last long after the ammonium salt had gone from the mouth. He felt that if the aerogenes were primed, they might have a lasting effect upon the lactobacilli. This he determined to be true. No one ahead of him had even suggested it.

If it had been known that the aerogenes might be primed and if it had been suggested that dibasic ammonium phosphate would do it, then perhaps finding that one proportion was a little better than another would be a routine experiment, although under the new patent law routine experimentation is no longer frowned upon. Nevertheless what Kesel did was to go diametrically opposite to the prior art so far as Grove & Grove was concerned, and in an entirely new direction so far as his basic premise was concerned. The discovery that the use of more ammonium salt would *reverse* the action of a little is the kind of thing the patent law seeks to encourage.

B.

Petitioners' Amm-I-Dent Is the Equivalent of the Patented Product, as Found by Both Lower Courts.

This is purely a question of fact.

This Court has held in *Graver Tank & Mfg. Co., Inc. et al.* v. *Linde Air Products Co.*, 339 U. S. 605, at 609:

"A finding of equivalence is a determination of fact.

> * * * It is to be decided by the trial court and that court's decision * * * should not be disturbed unless clearly erroneous. Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience."

Both courts below have found that the defendants' product is in fact an equivalent in its action of plaintiff's. As the District Court said at 1142 of the record:

> "19. The Amm-i-dent dentifrices are the equivalent of those disclosed in the Wach and Kesel patents and this equivalence has been widely advertised by the defendants Amm-i-dent and Block."

Conclusion.

Not only have the petitioners failed to present any ground which provides a basis for the writ but each question or point raised is clearly fallacious. Furthermore, this Court said in *Graver* v. *Linde*, 339 U. S. 605, that the question of invention, the question of infringement, and the question of equivalence are all questions of fact. On the question of invention we have concurrent opinions of the Patent Office, District Court and the Court of Appeals. On the other questions we have the concurrent opinions of both lower courts.

The petition should be denied.

Respectfully submitted,

CHARLES J. MERRIAM,
JOHN REX ALLEN,
Attorneys for Respondent.

ROBERT V. CONNERS,
ROBERT F. MONAGHAN,
RONALD J. ADAMS,
Of Counsel.

APPENDIX A.

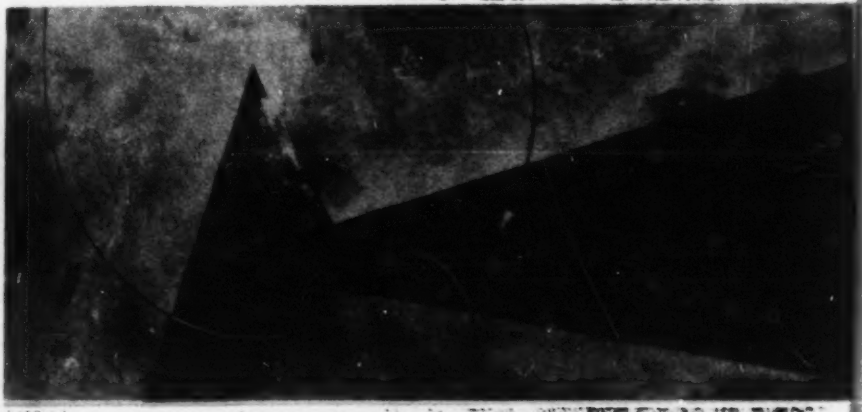
MR. PATTERSON

YOU'LL RECOGNIZE SYNERGISM!

We asked the artist to illustrate the concept that sometimes the whole can be greater than the sum of its parts. This phenomenon, as you know, is called synergism, and it is of great importance in ammonium therapy.

It came about in the search for a method of inducing ammonium nitrogen into the saliva in a form that would be generally acceptable. R. M. Stephan felt that ammonium ion was produced in caries-free persons by the action of the enzyme urease on urea normally present in the mouth. So, he recommended the use of carbamide (synthetic urea) as a prolonged-action mouth rinse for caries control.

Other experiments proved that dibasic ammonium phosphate was a most satisfactory source of ammonium nitrogen from the point of view of stability, taste, and odor.



(One triangle plus another triangle gives three triangles.)

That is where synergism came into it. When experiments were made to combine the acid-neutralizing and ammonia-liberating properties of the carbamide and dibasic ammonium phosphate, the two substances proved to have synergistic action. Each increased the effectiveness of the other.

We now had the basis for a dentifrice that was both safe and effective. The only remaining question was - what should be the percentage of urea? That brings us to the work of Dr. C. J. Henschel and the coming of Amm-i-dent.

Cordially,

Malcolm A. Clark

President

4- June 15, 1951

AMM-I-DENT, INC., [illegible] Jersey City 2, N. J.